

# Flatbed UV-cured Wide-Format Printer with optional Roll-to-Roll System



JETRIX 2513FQ  
JETRIX 2513FRQ

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## Introduction

This report is based on inspecting the JETRIX factory over a two day period. I also went to the JETRIX R&D facilities at a nearby building. Everything is outside Seoul, Korea. No major portion of this printer, that I am aware of, is sourced from China. Even the ink is developed, and manufactured, in Korea.

I have also inspected the InkTec ink factory: every aspect inside out.

Plus, I have visited an end-user, a customer site in Australia that had a JETRIX uv-curing flatbed printer, where I spent hours asking questions of the owners of the printshop.

And I have harvested comments from people within the worldwide wide-format printer industry.

Plus me, Jose Melgar have inspected JETRIX printers in 2008 when they first appeared in American trade shows. We also have taken notes on JETRIX flatbed printers at trade shows in 2009, 2010, and now in 2011.

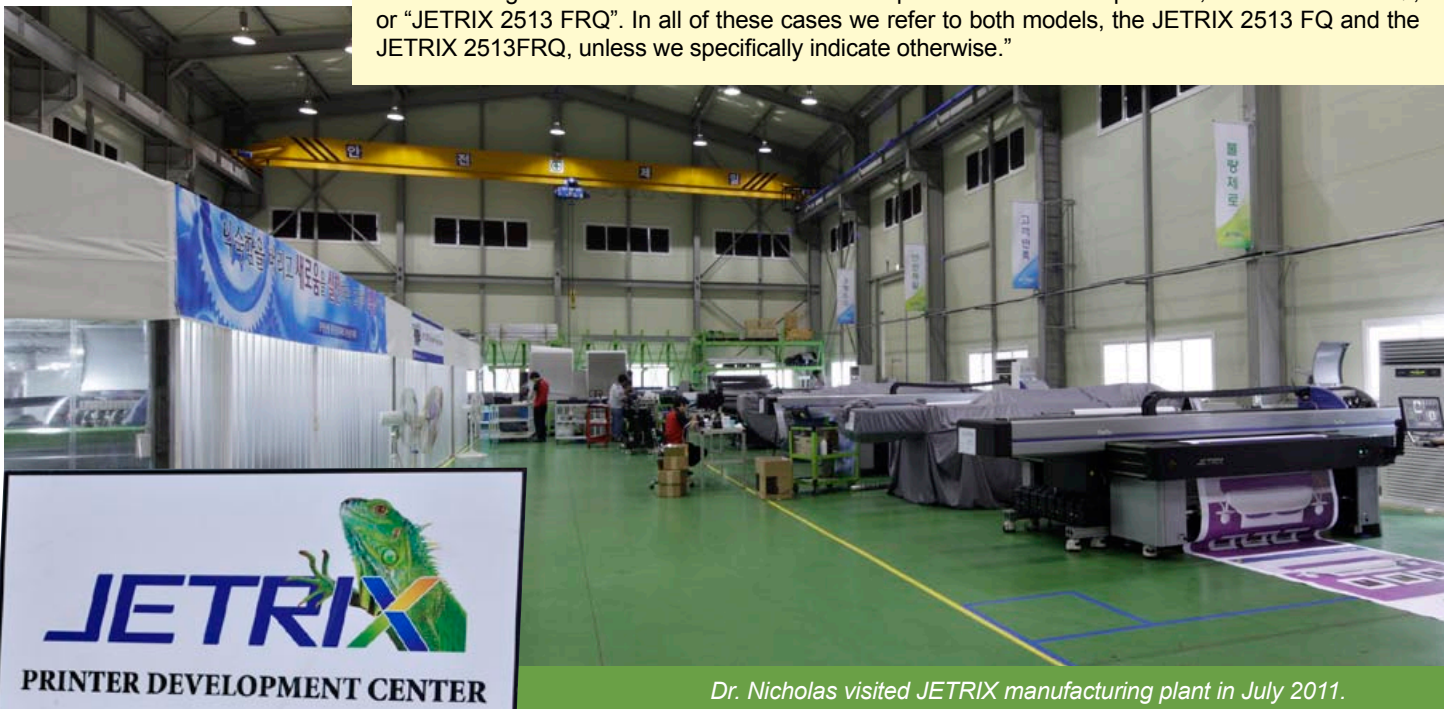
FLAAR is a research institute. Our goal is public education and research. In both education and research it is important to help end-users learn about both the pros and cons. This is

why I flew XY-thousand miles to Seoul, and why I flew six of us to FESPA 2011 Hamburg and why an entire wide-format team from FLAAR will be at SGIA this autumn.

If you want a Success Story (which is just a paid PR release), or if you want a pseudo-review (which is also not much more than a PR release) there are printer brands that use sham reviews. In distinction, we are not PR writers (and for sure we don't work for News of the World or for any Murdoch organization!). Instead we are a research institute headed by a person with a personal interest in digital imaging technology (who has been a professor of digital imaging at universities and community colleges) and who provides training to students so they can enter the wide-format inkjet printer industry.

We also have a personal interest in printing on wood, stone, glass, metal and other materials that are pertinent for museum display (since the background of our institute decades ago is in photography of architectural history and archaeology). So in order to suggest to museums, and to outdoor archaeological parks, zoos, and botanical gardens, what are good digital technologies for educational sign age, we ourselves need to know which are the reliable printers (that will not constantly break down)

**Note:** Throughout this evaluation we refer to the printers as “JETRIX printers”, “JETRIX 2513 FQ”, or “JETRIX 2513 FRQ”. In all of these cases we refer to both models, the JETRIX 2513 FQ and the JETRIX 2513FRQ, unless we specifically indicate otherwise.”



*Dr. Nicholas visited JETRIX manufacturing plant in July 2011.*



*At SGIA 2008, we were surprised to see a printer we had never seen before in trade shows in the United States. It was the JETRIX 2515, a sturdy UV printer we would start learning about from subsequent appearances in trade shows both in America and in Europe.*



## The Basics

### **1. Brand name, model?**

JETRIX 2513FRQ, this is the 2513FQ with roll-to-roll option.

### **2. What is the nature of the company? Is this company the manufacturer, distributor, or rebranding a machine made by someone else?**

JETRIX is a manufacturer and developer. JETRIX does the engineering, development, and assembly of the printer. As is usual with many companies, the frames, flatbed tables, and major structural components are brought to the factory for assembly.

Several of the engineers at JETRIX have experience of many past years. At least two of the personnel (and possibly more) started their experience with Hypernics; others moved from Hypernics to IP&I and then to JETRIX (others went straight from Hypernics to InkTec, which is the parent of JETRIX division).

### **3. What other printers are the same or similar chassis from this manufacturer or distributor?**

The JETRIX 2030 FK and FRK are a new generation with Konica Minolta printheads.

### **4. What other printers of other brands are comparable?**

The Océ Arizona series is comparable, but the earlier models are very slow (due to the Toshiba Tec printheads). The early models of Toshiba Tec printheads could also have issues

if there was dust in the printshop environment. Newer generation of Toshiba Tec heads don't get reports of those significant issues.

Nowadays there are several printers which combine a dedicated flatbed with a roll-to-roll. But these come in two forms: one form pulls the paper over the entire flatbed (Gandinnovations). That is not my favorite. The Mimaki system is comparable albeit a bit primitive (and has the disadvantage of LED curing, which is slow and does not always cure thoroughly). The JETRIX (and Océ) are a technology that I prefer: roll-to-roll without trying to pull the media over the entire top of the bed. But every manufacturer has reasons for their engineering decision, and every different solution has some advantage over another solution; equally, every solution has a downside.

### **5. Is this printer mature or still in alpha-stage or beta-stage?**

This is a mature printer based on three years' experience at JETRIX and another three years plus at IP&I and in some cases even more experience at Hypernics. Hypernics produced some of the most advanced printers in the world (including white ink possibly even before Durst launched that feature in their system). Nonetheless, I visited the R&D labs and JETRIX continues to work on additional features. So this printer is not a clone, it is an independent engineering development.

**6. What accessories are extra charge? Are these same or similar accessories included with other printers at no extra cost?**

The take-up reel system would be an option at extra cost if desired.

**7. Is it recommended, or required, to buy a spare parts kit? Or extra printheads?**

Distributors themselves have their own spare parts list, so it is not required for the end-user to buy the spare parts kit. However, if the end-user wants to do quick services to their printer, he can buy the recommended basic parts through the distributor. You can buy the main consumable parts and simple devices.

**8. Or do the dealers prefer that customers not try to make their own repairs?**

Every printer manufacturer and distributor has their own policy on whether they wish the end-users to make their own repairs. The philosophy of ColorSpan was to keep the end-user from fiddling with anything inside the printer. This was logical because many were first-time users of this kind of printer. The downside was that once you became experienced, or if your printshop was already advanced, the lack of access to the innards of the printer was self-defeating and undesired.

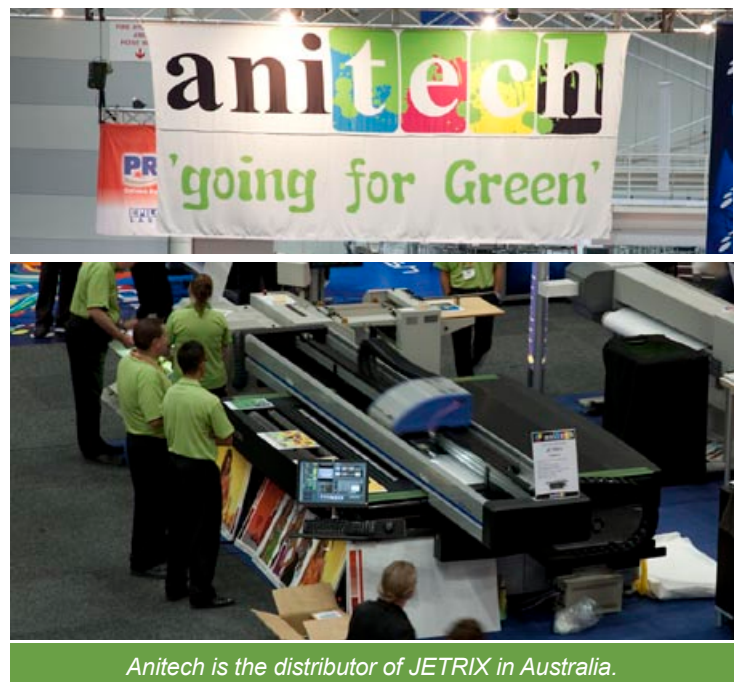
But there is no right or wrong policy (ColorSpan is not “wrong,” they are simply trying to protect newbie’s from making a mess of the inside of the printer. In general, the end-user is usually not encouraged to take the printer apart and do repairs on their own. Only later on, when you have considerable experience, and have taken advanced tech support training, would doing your own repairs be realistic. However I have visited many printshops where the printer operator prefers to receive this training precisely so they can do their own repairs. After all, if the manufacturer can train their own tech support person surely a printer operator, who also works with this printer every day all month all year, can also learn how to maintain and repair it (if they have the interest and inclination). This policy varies by manufacturer. Interest in doing their own repairs varies by the end-user and by the printer operator. A few operators like the opportunity to take service training at the factory and thereby to be able to do basic repairs on their own. Some manufacturers discourage this, but some manufacturers do allow end-users to take advanced service training.

## PURCHASING: DISTRIBUTORS & DEALERS

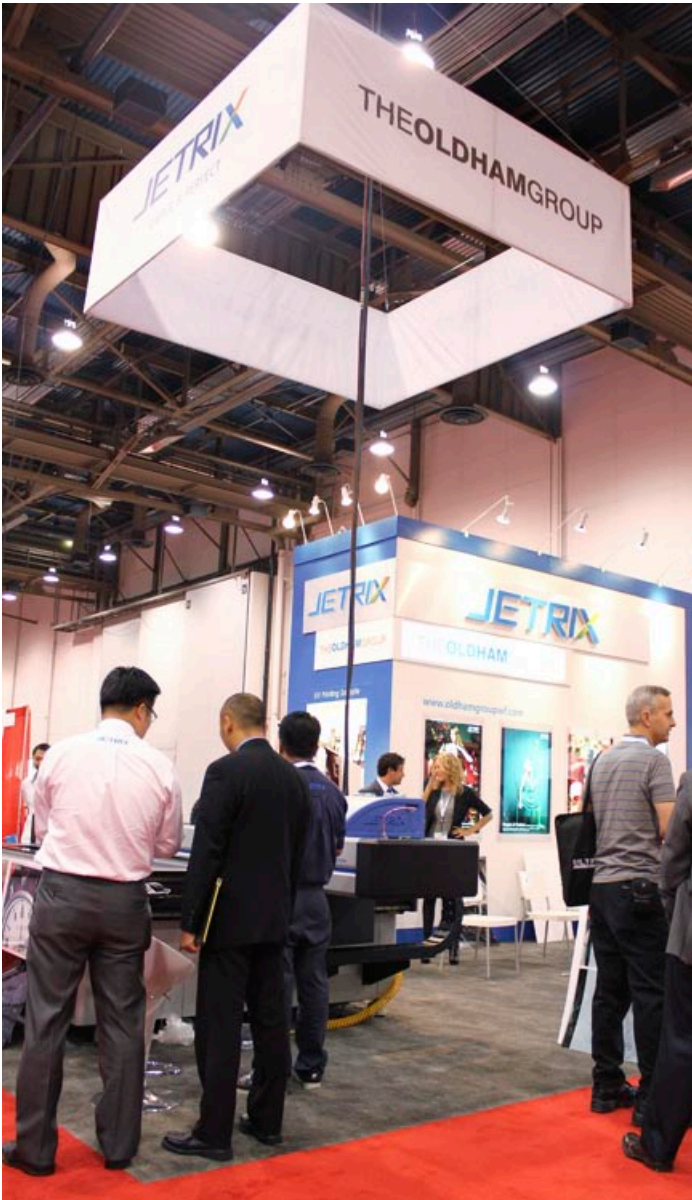
**9. Does the manufacturer have distributors in all continents? Or only a few dealers and missing key world areas?**

The following chart lists distributors in different areas:

Company	Country
SIGNTOP	The Netherlands
ESC	Germany
Outdoor Digital Druckzentrum	Germany
Complott Papier Union	Germany
The Oldham Group	USA
Anitech	Australia
InkTec UK	UK
Zenon	Russia
Siit	Japan
Techway	Hong Kong
Elekon	Russia
Ofsito	Czech Republic
Arrow Digital	India
Orange Cloud	South Africa
Print Support	Poland
Inchem System	Korea







The Oldham Group is the distributor in the United States. Europa Siebdruck-Centrum (ESC) is the distributor in Germany, and perhaps neighboring countries. Anitech is the distributor in Australia. Reportedly, this company has sold 15 JETRIX flatbed printers

#### 10. Where are distributors not present?

Several European manufacturers and most Chinese, Taiwan, and Korean manufacturers lack distributors in the US.

#### 11. Are there issues between the distributors and the manufacturer? Can you rely on the distributor today being willing to stay together with the manufacturer, or jump ship and potentially leave an end-user somewhat abandoned when there may not be a new distributor?

There are several manufacturers who are well known in the industry for having issues with distributors. This is no reason that their printers are faulty as a result, but if the distributor abandons the manufacturer because of squabbles with the owner of the manufacturing company, then an end-user may be stuck with no one to provide warranty service or after-warranty service at a fair price.



## FEATURES OF THE PRINTER: Vacuum

#### 12. Is there a vacuum function?

Yes.

#### 13. Is the vacuum created by simple fans, or by an air pump?

Air pumps.

#### 14. If pumps, how many pumps are there?

There are three ring blowers, situated inside the structure (in the middle, on the floor, under the table). Cheap flatbed printers abandon the air pumps outside, or when inside, are so loud that there is serious noise pollution.

The vacuum system has been designed to handle media difficult to grip because each ring blower have a power of 0.75 kw, so a total of 2.25 kw whereas the Oce Arizona 360 GT has a total vacuum strength of 0.75 kw.

**15. In how many sections?**

Each pump handles vacuum in one section: there are three pumps and hence three sections.

**16. Are the vacuum areas (size and position) user definable?**

The user can select one, two, or three sections, but can't divide a section or re-size a section.

**17. Can you turn one or the other section(s) off and on?**

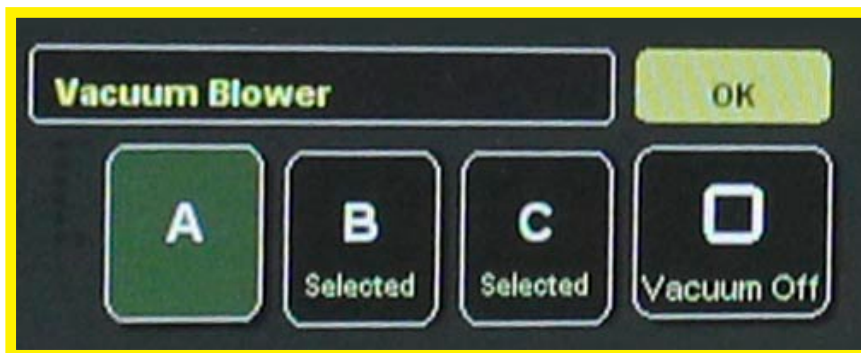
Yes, you can turn one entire section Off, or On, per your needs.

**18. Is the vacuum too weak for some materials? Does this mean you have to waste your time and tape materials down to the top of the flatbed table?**

Each vacuum system has an inverter for each of the sections. Then, through this inverter, the vacuum power is automatically adjusted



*These are the ring blowers inside the structure.*



*The vacuum system is software-controlled.  
A, B and C are the independent sections  
the system is divided into.*

*Apparently the vacuum sections are either  
on or off, so it is not possible to modify the  
strength of the suction.*





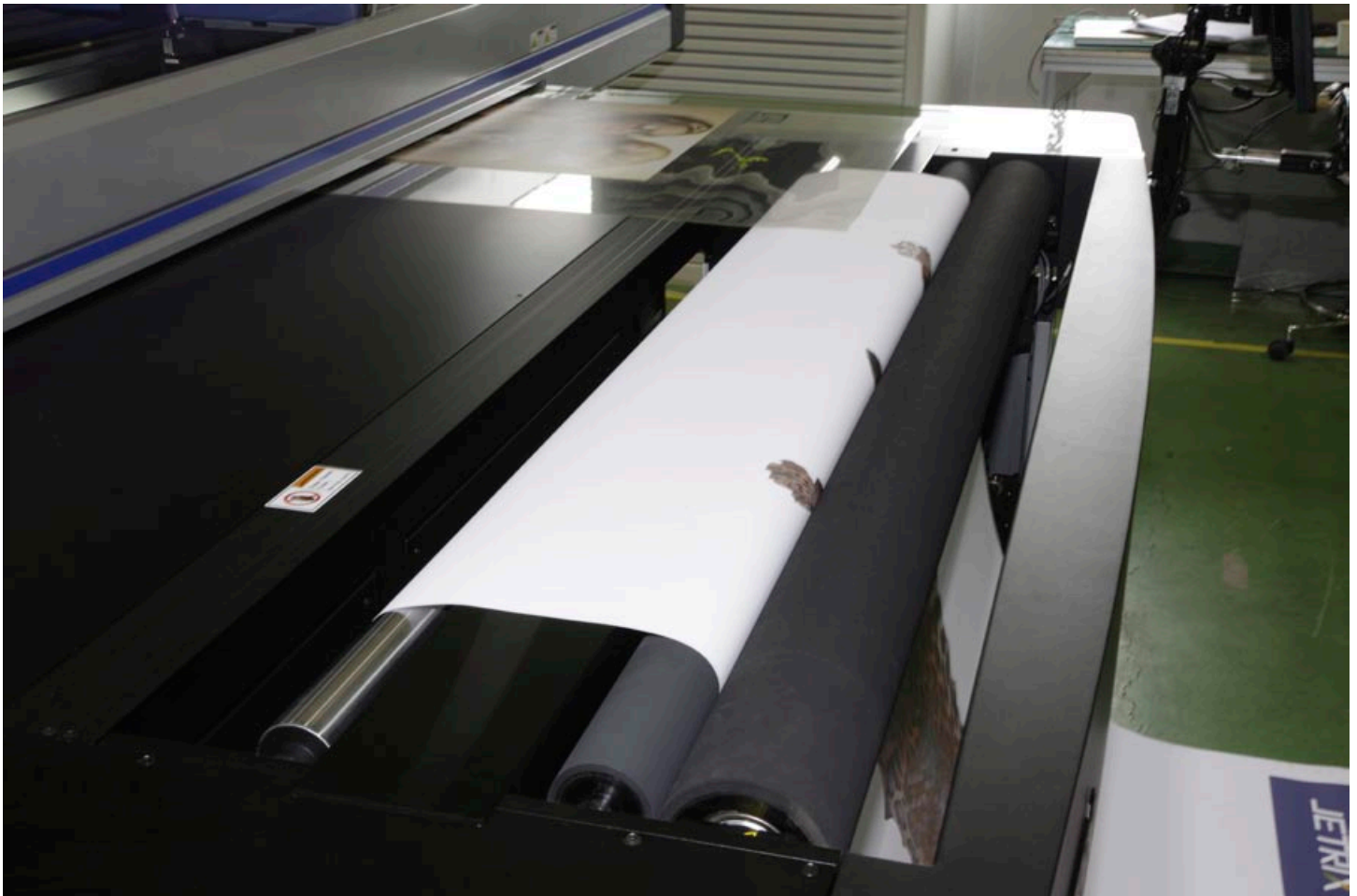
according to different media sizes, so the end-user does not need to adjust the vacuum power manually. There is no need to cover the vacuum areas that are not being used, as is needed in other flatbed printers.

With the Mimaki JF-1631, 1610, the Oce Arizona, the Gerber ion and some of the Inca models, it is necessary to put paper or thin foam core material on top of the entire flatbed area where you are not printing. If you don't do this, those vacuum holes will suck open air and there will not be enough vacuum under the piece of material that you need to print on. But I have also seen flatbed printers costing \$300,000 also requiring this, such as Gandinnovations (now Agfa) Jeti flatbeds.

## STRUCTURE OF THE PRINTER: Media Transport Mechanism & Media Path

***19. Is this a dedicated flatbed with no roll-to-roll capability? Or is this a true flatbed or just add-on feeder platforms at front and back?***

The JETRIX 2513FRQ flatbed printer is the 2513FQ model with the roll-to-roll mechanism included. The JETRIX printers are among the flatbed printers that handle real roll-fed materials with no banding.



*Although the JETRIX FRQ is in principle a flatbed printer, the roll-to-roll mechanism at the front makes it possible to handle flexible materials.*



**20. Describe the platen.**

The platen is about 4 to 5 inches wide, solid, with vacuum holes.



Lateral view of the JETRIX 2513FRQ

**21. Are there edge guards at each side (end) of the platen? At left, or at right, or both?**

There are no edge guards.

**22. Was this printer made originally as a UV-curable ink printer, or is it retrofitted with UV-curing? If retrofitted, what was the original brand or model?**

None of this is a retrofitted solvent printer; JETRIX makes only UV-cured printers.

## LINING UP FLAT MATERIAL (to help it feed straight)

**23. How is rigid media fed?**

As with 90% of the flatbed UV printers, you feed rigid media by placing it on the table with your hands.

**24. Is a feeder-stacker option available?**

Feeder-stacker units are expensive and rarely available except for printers costing over half a million dollars.

**25. What kinds of raised guide bars (alignment bars) along the side of the table exist? Left or right? How long?**

JETRIX's starting point of printing is the X,Y starting point on the flatbed. So it is not difficult to load the media based on the table starting point without raised guide bars

**26. Is there a registration gate that is lowered across the back printing area?**

Most printshops report that most rigid media is crudely cut and rarely are the edges really at 90° to each other. So you don't really want to align a corner, you want to align one side (on one end).

## FLATBED ASPECTS (for dedicated flatbeds)



*If you examine printers at trade shows, you will know the quality of the machine to some degree, but one of the best ways to evaluate a printer is by visiting the printer's manufacturing plant. Here, Dr. Hellmuth evaluating the printers inside out at JETRIX headquarters in Korea.*

### **27. If a dedicated flatbed, how many sections is the flatbed surface divided into?**

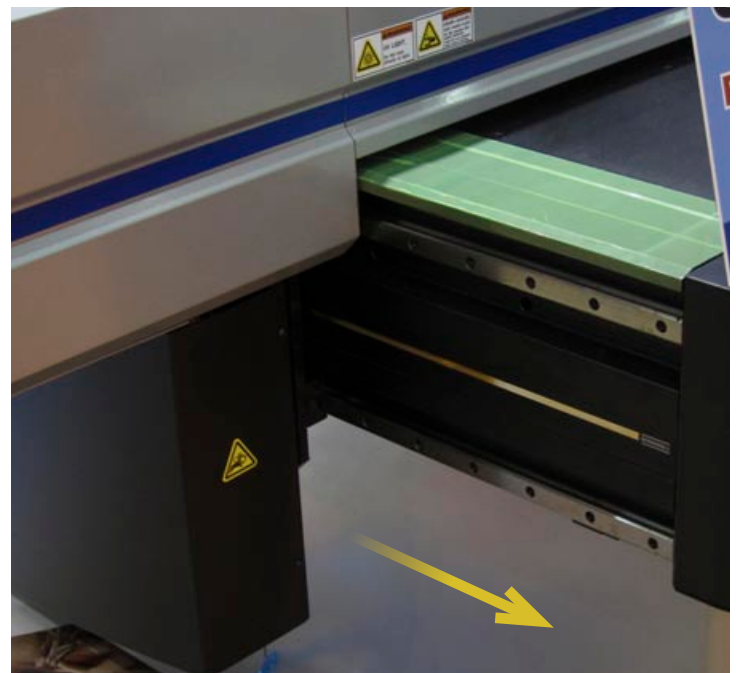
The flatbed table is one solid piece, but it is formed by three sections for vacuum control.

### **28. Is there a pinch roller system for the flatbed, and if so, where is this located?**

There are no pinch rollers. But, yes, there are actually dedicated flatbed systems that also have pinch rollers. Indeed one Chinese flatbed has two sets of pinch rollers atop the flatbed. There are even some combo systems (with moving transport belt) that also have pinch rollers: the Durst Rho 700. Of course this begs the question of whether its vacuum system needs the pinch rollers. But pinch rollers can be more assistance than moving the media-- a pinch roller can keep the trailing end of a piece of foam core from lifting up (curling up) as the front end is being heated and printed on. So, if you wish to keep an entire foam board flat from front to back, you may need pinch or pressure rollers in addition to a vacuum system underneath.

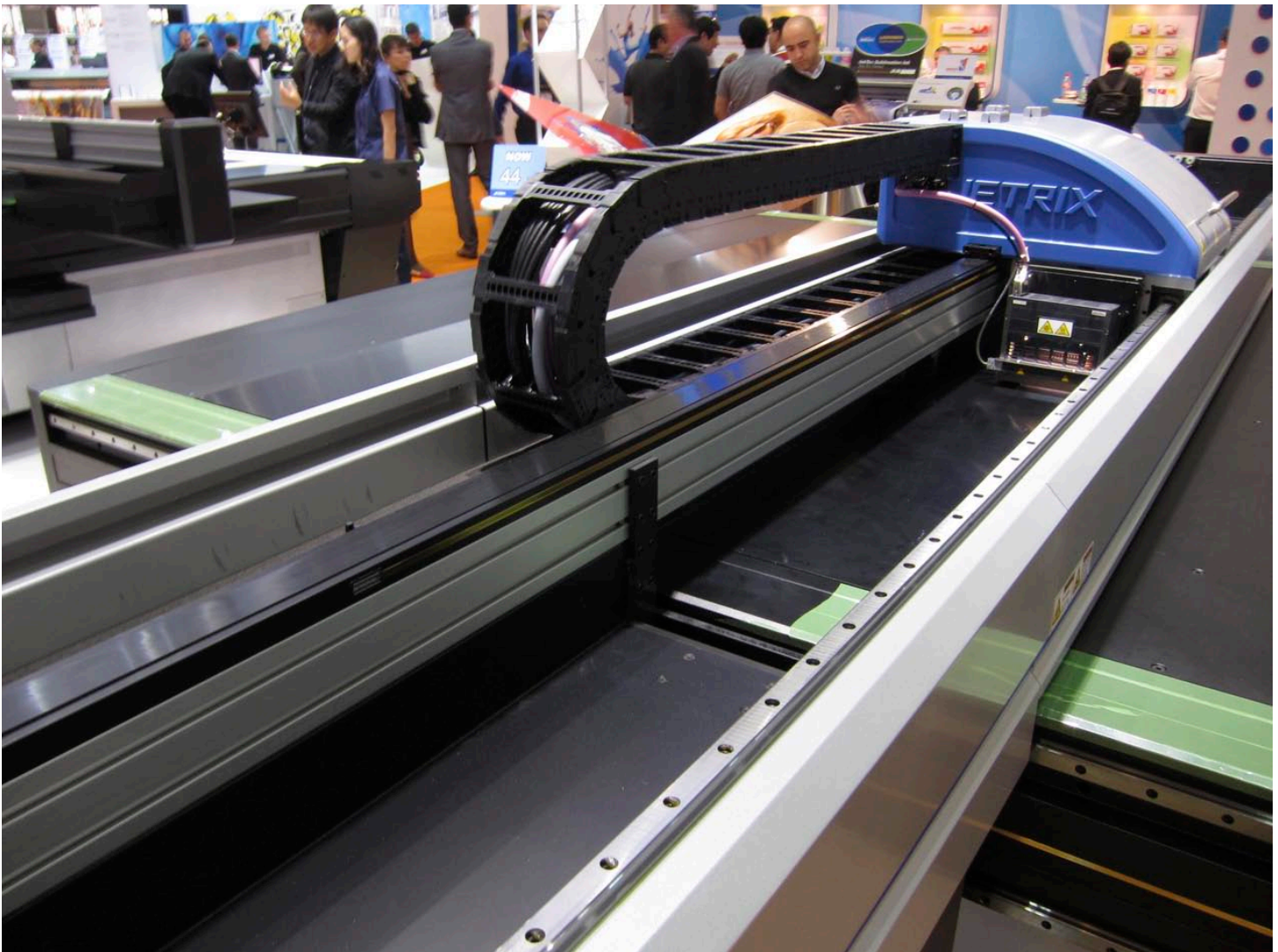
### **29. Does the table move? Or only the gantry above it?**

The table is stationary; only the gantry moves. The printer uses a linear scale on both X and Y axis to make them perfectly controlled.



*The flatbed table is stationary. The movement of the gantry is "read" by a magnetic encoder, one at each side of the table, to ensure accuracy of the movement.*





On the 2513 models, the printhead carriage travels across the widest dimension. On the newer model, the JETRIX 2030 FRK, the movement occurs in the narrow dimension of the flatbed table.

**30. If no pin registration system is present, what kind of other registration system is available?**

There is no registration system, but if you wish one, it is easy to add one yourself.

**31. Does the printhead carriage move across the widest dimension of the table (like Gandy Jeti or Océ 250), or across the narrow dimension (this is how Inca does it)?**

Printhead moves across the widest dimension is best.

**32. What are the pros and cons of a dedicated flatbed compared with a combo printer (with moving transport belt) or hybrid printer (with platen)?**

But even dedicated printers have their downsides too; with a dedicated flatbed you (the operator) are idle, totally, while the printer is printing. You can't load or unload anything (except on some of the newer million-dollar printer systems). But if you have a top-of-the-line combo printer, such as the Durst Rho 700 or 800, you can load at the back while the printer is cranking the previous job of flat material out the front: this can print and load and unload all at the same time. I have seen this ability to feed-while-printing also with the ColorSpan 9840uv (HP Scitex FB910).



But with a dedicated flatbed printer, there is less alignment issue just because the media is not cut squarely from the factory. Poorly cut material is a major disadvantage for combo or hybrid printers. So again, the reason there are more than four different classifications of UV printers (hybrid, combo, dedicated flatbed, dedicated R-t-R) is because each has pros and cons.

In theory, the perfect printer would be a dedicated flatbed with a dedicated roll-fed system across the long axis. Océ is the first with a functioning version of this double concept. Now this concept is also available from JETRIX.

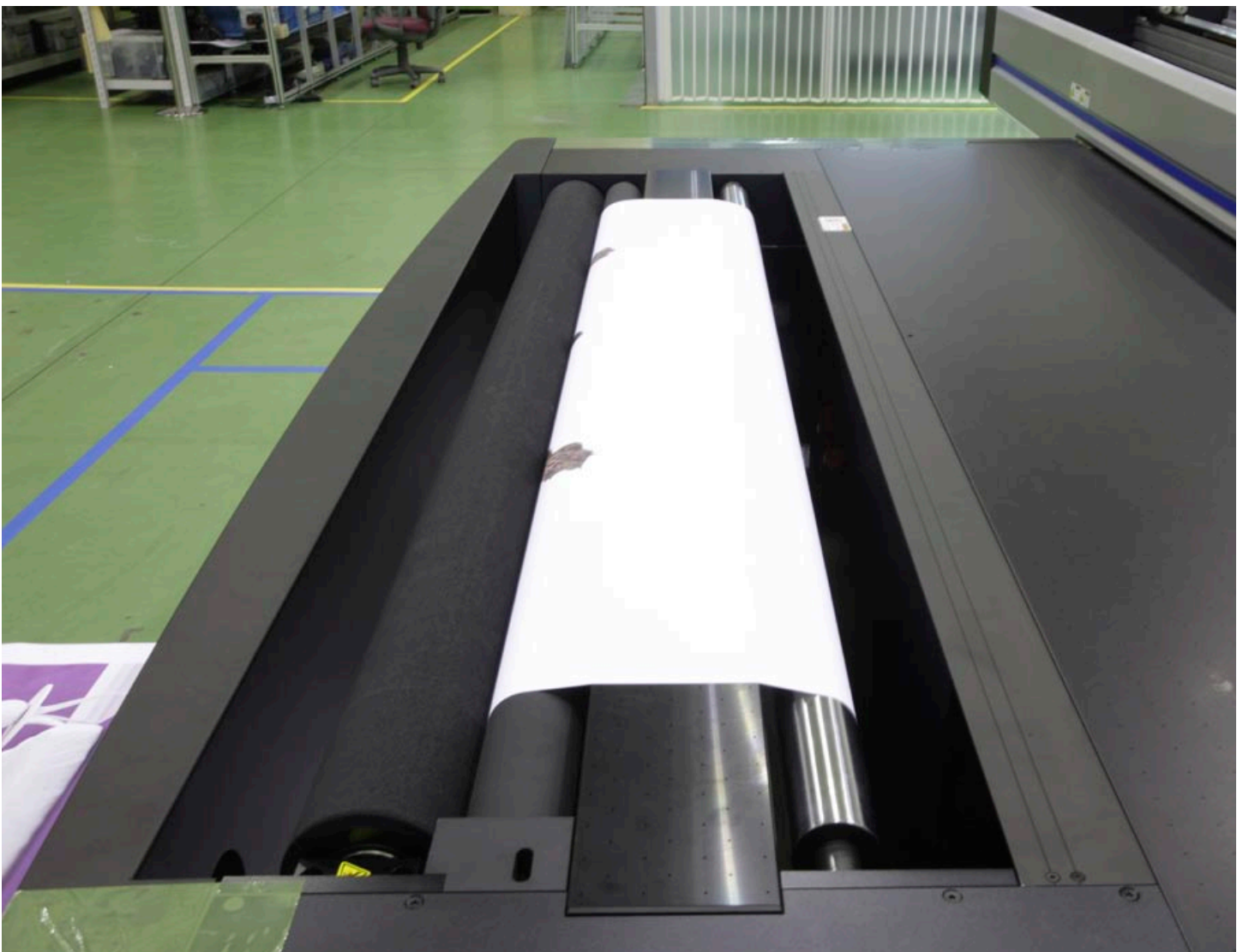
## ROLL-FED

### ***33. How is media held flat? Vacuum table? Pinch rollers?***

Media is held flat by light vacuum under the platen, and by tension from the tension rollers.

### ***34. How is roll media fed? Pinch roller against grit roller?***

No, this system uses tension system; not grit rollers. Normally grit rollers are on low-end printers; normally tension systems are on high-end printers.

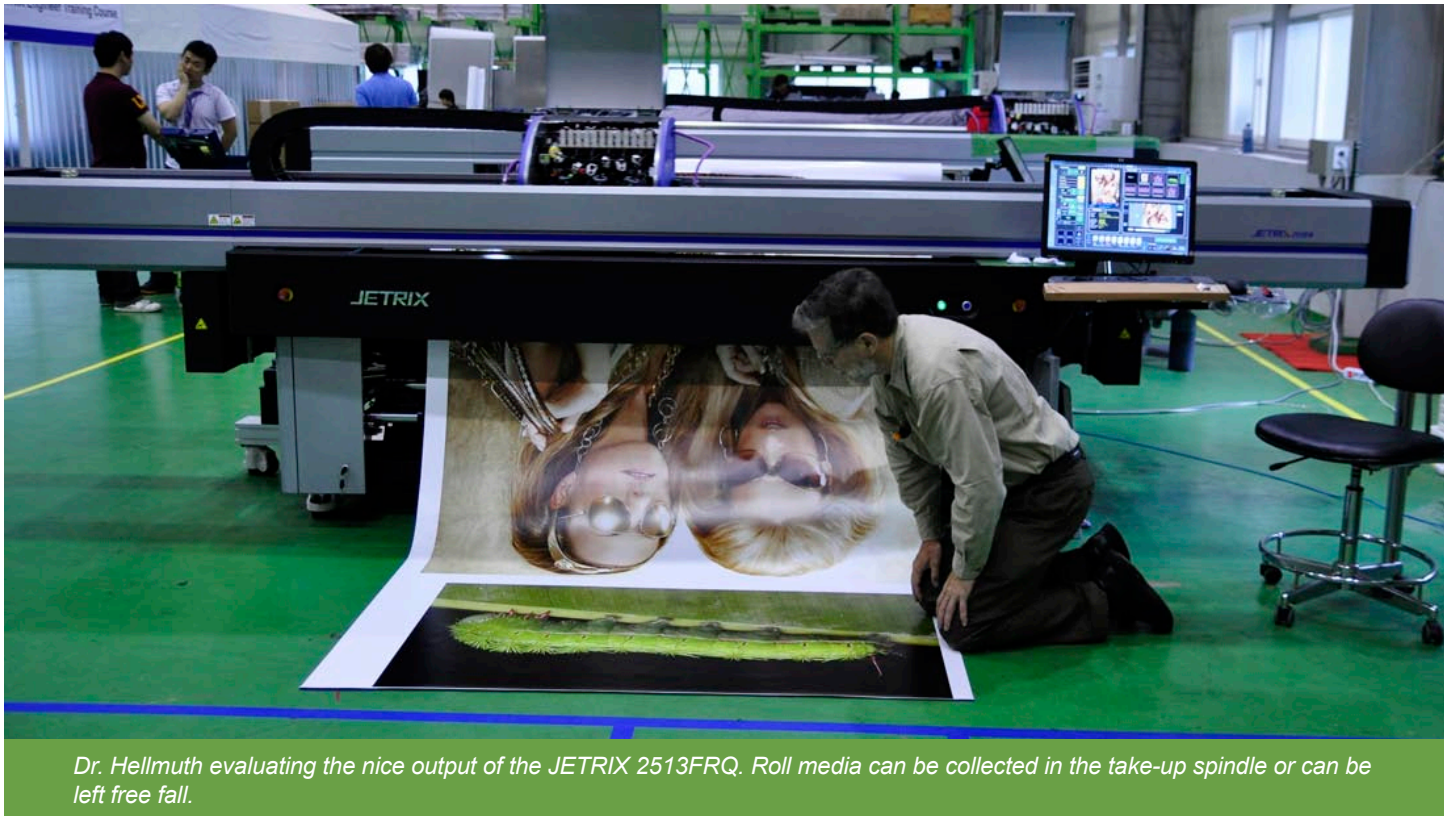


*JETRIX 2513FRQ roll-to-roll system.*

**35. How is the roll held at the feeding position? On a spindle? On a saddle?**

All dual structure flatbeds have the media on a spindle; none use a saddle.

A saddle is formed of two rolls with a slight space between them. You rest your roll of substrate on the saddle created by the two adjacent rolls. You don't need to run a spindle through the roll. You don't need to fumble loading the end of the spindle into two holders (one at each end). Loading a saddle is quicker as a result. But a saddle is primarily used on heavy-duty industrial printers 3.2 meters or wider where the weight of a roll may cause a spindle to sag. Plus, it's a headache to thread a spindle through a 5-meter long core.



Dr. Hellmuth evaluating the nice output of the JETRIX 2513FRQ. Roll media can be collected in the take-up spindle or can be left free fall.

**36. Is there an air (pressure) core system?**

Air core spindles tend to be used only on grand-format printers costing over a quarter of a million dollars. So air core spindles are not expected.

**37. How is the roll media handled at feeding position? For example, is there a dancer bar? If there is no dancer bar, is there at least a tension bar?**

A tension bar goes up and down. A dancer bar tends to move diagonally. Each one changes position as tension is needed. The roll-fed system of JETRIX has both.

**38. If this is a dedicated flatbed or a combo design, is the roll-fed mechanism an option, or is it included?**

The roll-fed system is an option, but with no roll-feeding the printer designation is different.

**39. Is the feeding area for roll-fed material physically attached to the printer or is it out in front and not attached (as on the GRAPO Octopus).**

Skew is a common downside of a conveyor belt transport system. The reason is because the belts are flexible. To some degree the flexibility is inherent, since most belts are woven material. The heat will also cause the belt to become flexible. These aspects are not specific to Grapo but are one of the pros and cons of the combo transport belt system.



As a result Grapo learned that it is actually more practical to have the media roll out in front of the printer rather than the roll-fed mechanism being bolted to the front of the printer. If the roll-fed system is rigidly affixed to the front of the printer, and has no manner of fine-tuning the position of the feeding rollers, after many months the rolls may not be 1000% parallel to the transport belt. By having the roll-fed mechanism free, and movable, you can allow the paper to feed itself in a parallel manner.

Plus, the movable roll-fed unit allows you easily to move your media around and change media (if you have a second roll-fed unit you can simply switch the entire unit rather than having to off-load and on-load a different kind of substrate).

But no other printer manufacturer in the world (other than GRAPO) puts their media loose out in front. And especially on a dual-structure flatbed, I would expect the media feeding to be physically attached to the printer.

#### **40. How do you fasten roll-fed media to the take-up reel?**

Take-up reel system is an option that you have to request if you need it. Since this is a dedicated flatbed system, it is assumed that you will be fine with the roll-to-roll with no take-up reel. Besides, it is much better to let the printed media be open (to outgass openly). You do not want the fresh UV prints (or fresh solvent prints either) to be rolled up.



*The roll-to-roll mechanism is totally assembled inside the chassis. This might seem obvious, but for example the Agfa :Jeti flatbed printers have the roll system independent of the chassis. We believe JETRIX's design is better in terms of avoiding skewing issues.*

#### **41. Describe the overall path of the media through the system?**

A simple path is neither a major benefit nor a defect. A simple path means that it's easier to load and there is less to go wrong. A more sophisticated system may have advantages for feeding some kinds of media.

#### **42. How much media is wasted during loading and feeding?**

With some brands of printers you suspect that they are deliberately designed to waste ink and media since this is how those companies get their profits. Media is moved too far out before you can cut it, resulting in media being wasted before and after cutting, etc.



The amount of waste also depends on whether you need to attach the leading edge of the media to the take-up spool, or whether you can simply leave the leading edge up on the platen or up on the conveyor transport belt (as is possible on the Grapo Octopus II and some other combo printers).

There is less waste on a dedicated flatbed printer because there is no material used in loading or feeding up to the point it is printed upon.

On the roll-fed portion of the JETRIX printer, there is hardly any media lost during feeding the media through the system since there is no take-up reel.

#### ***43. Can you print on more than one roll of substrate simultaneously?***

Being able to print on several different rolls of material simultaneously is common on grand format solvent-based printers but almost unknown (and unavailable) on printers less than 104 inches. The Durst Rho 351R offers an option to allow printing on two different rolls simultaneously. These are close to half-million dollar machines. It would not be expected to need to print two separate rolls simultaneously.

## **STRUCTURE: Miscellaneous**

#### ***44. For handling ink that passes through the weave of fabrics or mesh, is there a trough? Or other mechanism to catch the ink?***

A trough is possible most easily on a printer with a fixed platen. But a trough for mesh or fabrics tends to be present only on a printer costing a quarter of a million dollars or more. So there is no textile trough on the JETRIX (and not a trough on any competing brand that I can remember either).

There is no easy way to put a trough on a combo style printer. If you need to print on fabric or mesh with a UV combo printer you need a liner or you need to put an intermediate sheet onto the surface of the conveyor belt (or clean up the ink that passes through the weave).

#### ***45. Is there a cutter? Is it manual or automatic.***

Most combo-style printers have no on-board cutters. The Durst Rho 351R has a manual cutter since this is a dedicated roll-to-roll printer (meaning it has no moving conveyor belt). So roll-to-roll systems are more likely to have an appropriate location for a cutting element and even potentially a cutting slot. But it is not normal to offer a cutter on a dual structure roll-fed system.

#### ***46. Is there a “knife guide,” a slot where you can draw your knife down and across the width of the substrate?***

Most combo-style printers have no area to put such a knife slot.

#### ***47. Does the printer have levels built into the structure of the printer?***

The only entry-level or mid-range hybrid or combo printer where I have noticed levels actually incorporated into the structure of the printer are the UV-curable printers of Dilli. There are no built-in levels on the JETRIX; you simply use any carpenter's level if you need one.

#### ***48. Does the printer have leveling supports? How many, and how strong?***

Leveling any UV printer is crucial. As will be described in the next comments of this section, the JETRIX flatbed is designed so that it can be installed perfectly leveled, as this is an important factor to ensure the best print quality.

The NUR factory, (acquired by HP) once the structure is leveled in the assembly room, rather than roll it from stage to stage, all construction stages take place with the printer not moving from stall to stall.

**49. Does the printer have wheels? How many, and how strong?**

The JETRIX printer has a total of 8 sturdy wheels. The roll-to-roll unit has its own independent set of white-shielded wheels and leveling supports. So JETRIX has a really precise structure, and because of the 8 leveling supports, it is possible to have the printer accurately leveled.

**50. Are the leveling supports part of the wheel, or are the wheels and leveling supports separate?**

The leveling supports are independent of the wheels. It is “built like a tank” and does not skimp in features. This is not a low-bid printer. You get the appropriate fixtures and features that are needed.

**51. Do the wheels have a lock on them?**

For any printer weighing over one ton it is assumed that no locks or brakes are needed on the wheels because a tank will not roll anywhere if parked on a level floor.



JETRIX 2513FRQ wheels and leveling supports.

## Miscellaneous

**52. What moves:**

- The flatbed platform,
- The printhead area,
- Only the material (fed by roller table; then gripped and fed by the printhead area mechanism as on a regular printer; or both?

As mentioned before, the flatbed table is stationary; what moves is the gantry (Y axis) onto which the printhead carriage goes back and forth (X axis). In the case of the JETRIX printer with the roll-to-roll mechanism, it has 5 motors, one for the movement in X, two for the movement in Y axis, and one for Z, which is the movement of the printhead carriage up and down.

On the Inca Columbia the flatbed itself moves in and out for every line of print. The 3M (Leggett & Platt) machine is unique in that it has two options for movement, both the material and the head assembly in X, Y directions.

Most traditional combo style UV printers move rigid materials with the transport belt and move roll-fed materials through a combination of the transport belt and the roll-feeding and take-up rollers.

**53. If the objects you are printing are not as wide as the full width of the printer, does the printing carriage still have to cross the entire space, or can the printing assembly hover just over the area of what has to be printed (and thereby be a bit faster?).**

Yes, most sophisticated printers can hover. But this may cause too much heat build up over one part of the printer. So your software also needs to be able to modify the hovering position if so desired. This is a decision the operator has to make.

## OPERATING THE PRINTER

**54. Can the operator manage print jobs via the Internet with this printer?**

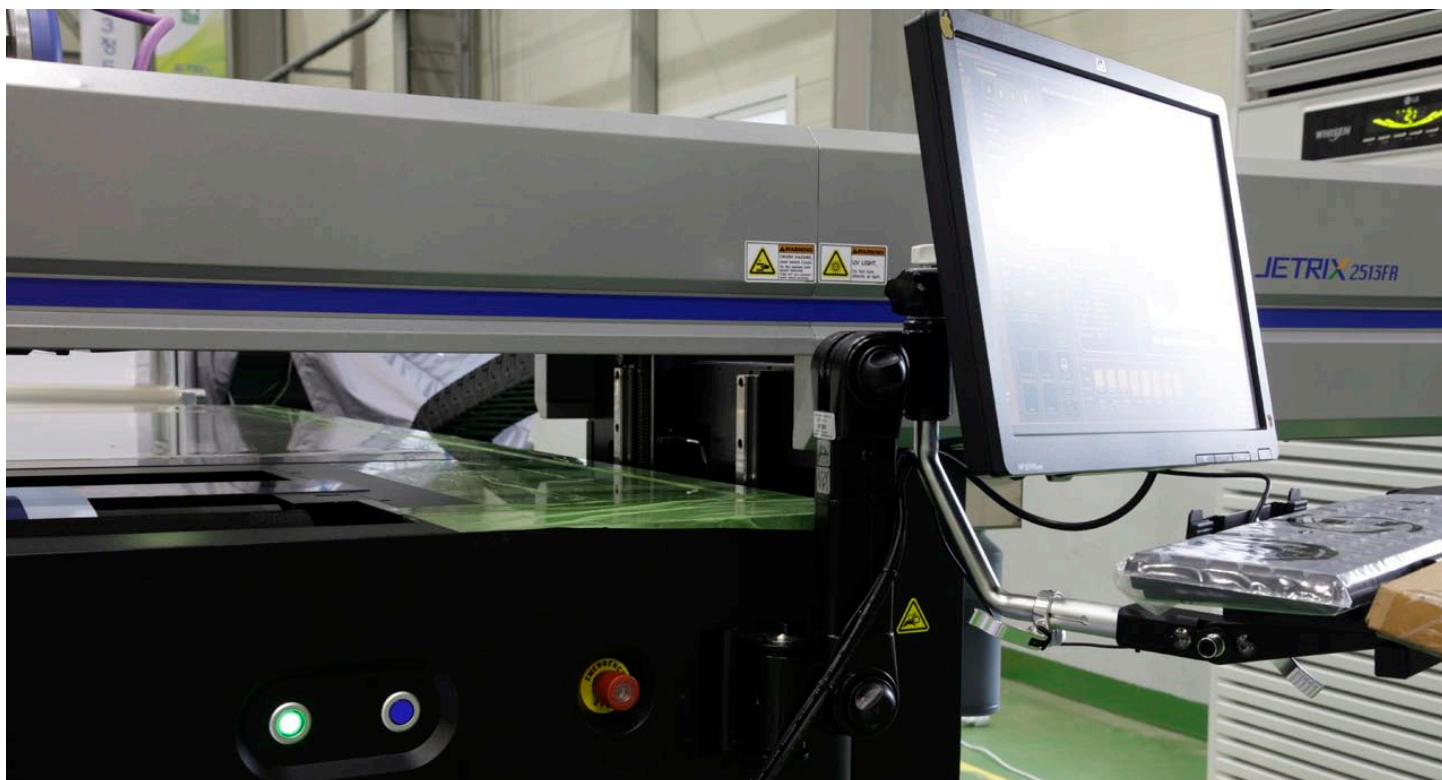
Not normally.

**55. In the main area for operation, is the machine software based (touch screen), or with physical control buttons? Or both?**

The JETRIX was controlled by a touch screen before, but since the monitor provider began to sell the iPad, the touch screen monitors were no longer available. Most operations are controlled in the traditional way, with the mouse. Although there is a keyboard, you will hardly ever need it. So even if it is not touch screen, it is easy to operate because the GUI (graphical user interface) is very user friendly.

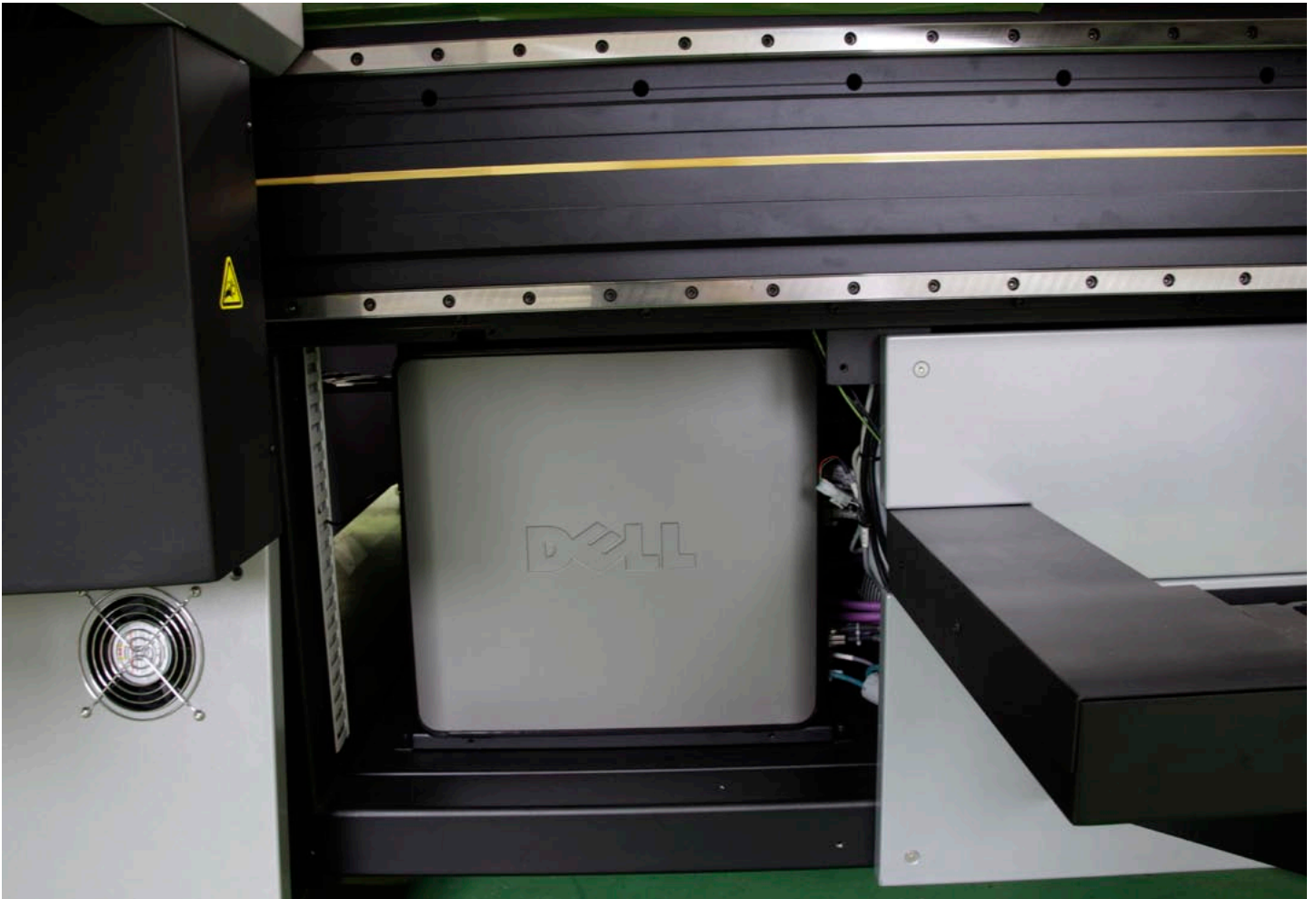
**56. Is there a pole with beacon lights?**

Dilli was among the first to use a vertical pole with beacon lights. One person said that DuPont's UV printer from RTZ (Flora) was the first of all. Most other printers do not have such a beacon. Presence of a beacon is not a major plus point; absence of a beacon is not a significant minus point. The GCC StellarJET 183UVK also has a pole with beacon lights.



*The fact that the monitor can rotate and its height can be adjusted makes the JETRIX a printer easy to operate.*





*The printer is controlled by a DELL computer.*



*The main operation area is at the right. The monitor can be rotated and moved in vertical direction.*

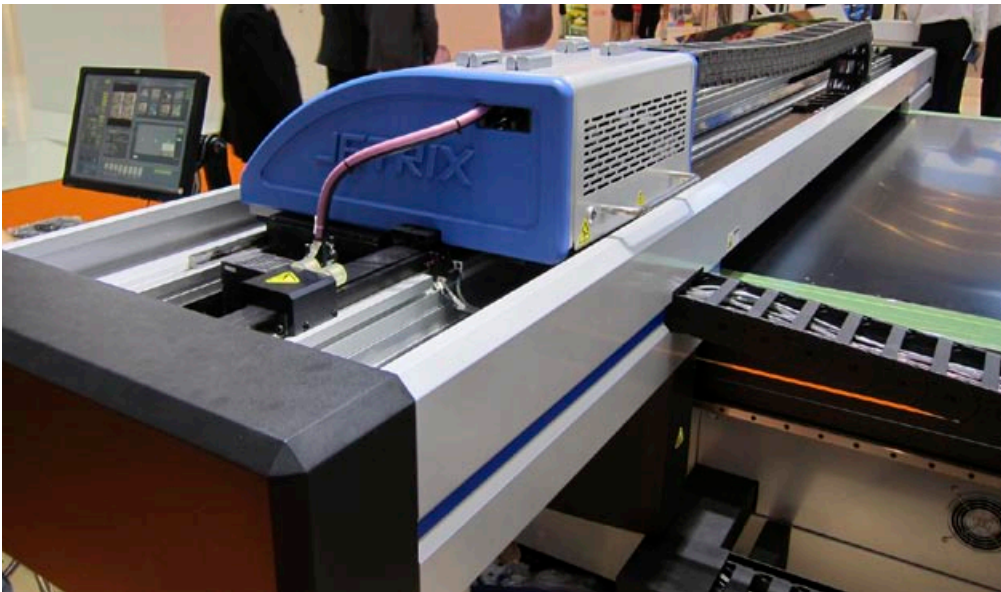
## CONSTRUCTION (BUILD QUALITY)

### 57. When designed, what is the life-span that each part is tested for?

For many manufacturers, parts life-span is a new concept, especially when the cost of the printer needs to be kept down. But if the EU requires a guaranteed parts life-span, this will impact Chinese printer manufacturers in particular.

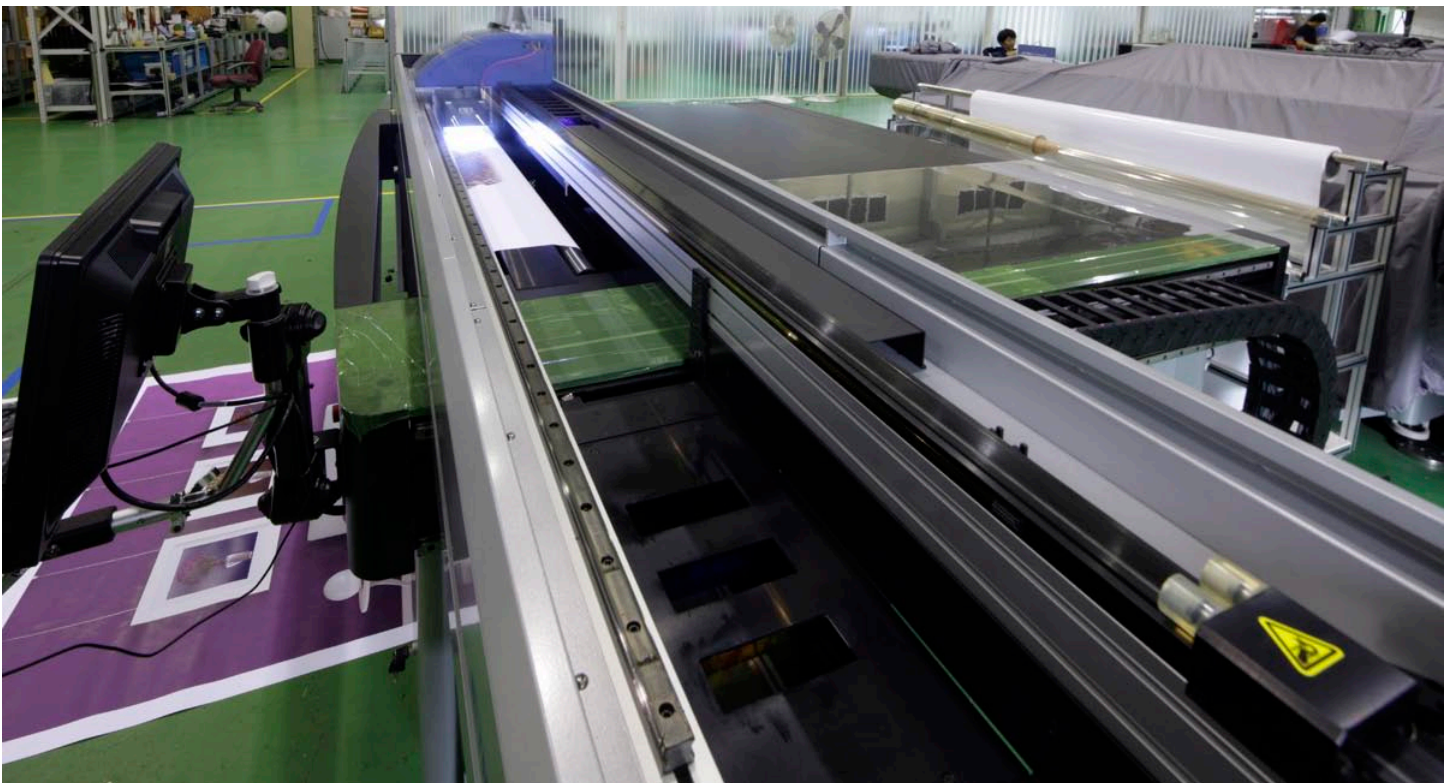
### 58. Is there a hood?

Since this is a flatbed printer, there is no hood. However, the JETRIX flatbed printers are cleverly designed with a cover along the X axis to shield UV light at all times. If you look at other flatbed printers, there are not many adequately designed to protect operators from UV light. For example the expensive SwissQprint is still lacking a proper system to shield strong UV light.



A hood protects you from most UV lamp light leak. A hood protects you, to some degree, from misting UV ink. With a hood it is easier to exhaust ozone and misting UV ink (if you attach a ventilation system to a vent opening in the top of the hood).

*The frame that shields UV light is the full length of the gantry. Left, the JETRIX 2513SQ model at FESPA Hamburg. Below, the model at JETRIX factory.*







*The most important part of a FLAAR evaluation is our ability to document that the physical structure of a printer is well designed and precisely assembled. For example, only if we inspect a printer, in-person, literally inside-out, can we know the potential reliability of this printer. These are the reasons we visit the factory and why it is essential to have these images.*



## AESTHETICS

### 59. Can you easily distinguish which is the “front” and which is the “back”?

I call the front the area where the LCD and operator panel(s) are situated. This usually means that the other side is where you feed the material in. I call that the back. But many printer companies call the feeding area the front. It makes no difference as long as you define what you mean in advance.

Some UV-curable printers have a moveable control computer that can be situated at one end, or at the feeding area (whichever location the operator prefers). But the standard arrangement is that the LCD and keyboard are on the output side. I call this the front.



*Is very easy to distinguish which is the front and which is the back of the printer.  
In general the design of this printer is very professional.*

## TRAINING

### 60. Is training necessary?

Training is essential for any UV printer, whether an entry-level machine or high-end. Lack of training, incomplete training, and lack/or of experience are a factor in about a third of the problems that people have with UV printers. Another third is often inadequate cleaning and maintenance of the ink and printhead system. The other third cause of problems would naturally be weak parts (that wear out before they should), wear-and-tear (happens even to the strongest parts made in Switzerland), and features that need improvement, etc).

### 61. Is classroom training available?

No, classroom training is not common.

**62. Is factory training available?**

No, factory training is rare, though some companies do welcome factory visits, and a few companies do indeed offer training at the factory.

**63. What on-line training is available?**

Fewer than 5% of the UV printer manufacturers offer on-line training.

**64. Between the day the printer arrives, how soon is it realistic to achieve full productivity?**

If a printer is mature (and out of beta stage) you can achieve full productivity within a week or month. But many owners have told me quite frankly, that it took them several months to achieve full productivity. The longest time before a printer is really productive is when a printer is still in beta stage when you buy it. It takes a while for the firmware and hardware to be improved and updated.

After speaking with many different printshop owners, what I am learning is that if the printer is cheap and junky you will have constant down time due to the printer breaking down (reports from owners of Infiniti UV printer). If the printer is expensive and complex, it takes longer to understand everything and achieve full productivity. And when an expensive and complex printer does break down, it takes longer to repair.

## TECH SUPPORT & WARRANTY

**65. What is the original warranty period?**

The normal original warranty period is one year. Parts and labor are included.

**66. How does this warranty period compare to warranties of comparable printers?**

The warranty can be extended beyond the standard year. Roland also now offers a two year warranty but this is because they want to sell you Roland branded ink and Roland branded substrates. They can only sell you these higher priced consumables if they provide a free warranty. If you do not use Roland ink, the warranty is voided anyway. But there are not really any or many UV printer manufacturers who sell their own branded media, so there is no reason for a UV printer manufacturer to offer more than a one year warranty.

In the past Grapo offered a two-year warranty. That is because their UV printers are relatively simple (in a positive sense, meaning less to break down).

**67. Can the manufacturer remotely diagnose the printer?**

This is one of the interesting features of the JETRIX flatbed printer: JETRIX tech support staff can check and handle the user's GUI via internet to do tech support directly.

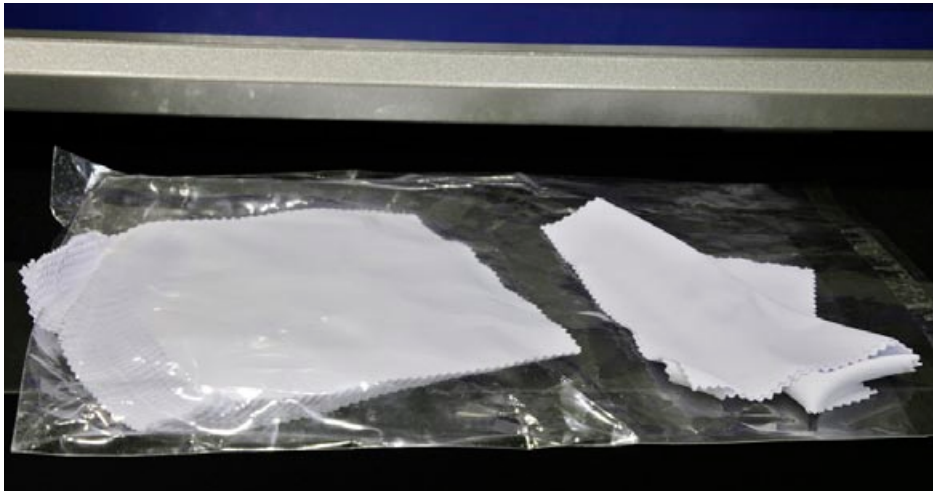


Steve Draper is the Director of Total Graphics Solutions, a company that provides tech support for the JETRIX printers in England.

## CLEANING & MAINTENANCE NEEDS

**68. If done with a flush solution, how do you add the flush to the printheads? With a syringe, or a manual button or toggle switch, or automatically with software command, or other method?**

With most mid-range UV printers, you manually turn a valve to open the ink lines so that the flush will flow into them. In cheaper printers you have to inject the flush with a syringe by hand.



*Printheads are cleaned with special wipes. In most of the cases, the printer manufacturer provides these with the maintenance kit.*

**69. Are there wipers?**

You need to decide if a wiper is as effective as a well trained operator doing a manual wipe with a special cloth. Also, if you don't clean and maintain an automatic wiper it can do as much harm as good.

Wipers are not recommended by KonicaMinolta for their printheads. Mimaki made the mistake to feature wipers for their Toshiba Tec printheads. These wipers (and those heads in general) are one of the causes for issues with the Mimaki JF-1631 flatbed UV printer.

**70. Does this printer spit, or “weep” (“flash”) ink at regular intervals?**

Solvent inkjet printers spit ink at the end of every pass in order to keep all printhead nozzles open. The reason is that if you are printing a banner with an area of pure cyan, then the other printheads will not be jetting ink (since their colors are not called for). In theory these nozzles will clog while not being used. So spitting allows all nozzles to eject ink occasionally.

Another way to allow all nozzles to squirt ink periodically is to have a band of CMYK or a band of six colors (CMYK light Cyan light Magenta) at one or both edges of the image, immediately outside the image area. This pattern causes every color to jet even if these colors are not being printed in the image itself.

Although most UV printers do not require a band of printable colors along the edge, many UV printer manufacturers do recommend spitting. However some UV printers do not have a spitting capability.

## MAINTENANCE

**71. What is the most delicate, or complex, or time-consuming cleaning or maintenance chore?**

In general, printheads are among the most delicate components of a printer. This applies to all wide-format printers. However, the metallic nozzle plate of the Spectra printhead model used in the JETRIX 2513FQ and 2513FRQ is built with tested materials for industrial endurance. In the section of [Printhead Technology](#) we discuss more details of the printheads.

**72. What is the average number of maintenance calls per printer per year?**

JETRIX get an average of 10 to 15 calls a year from the distributor. But the technicians honestly estimate that the distributors might receive much more calls. Maintenance calls are normal in all UV printers. I had the opportunity to visit a high-end printer manufacturer, and even at that level the technicians were receiving calls from end-users.



### 73. How long can the printer sit unused?

If idle for more than several days, it is recommended to flush ink from print heads completely and replace with print head flush solution. Actually it is best to use your UV printer every day. If you are not going to use it every day, fill the system with flush solution and cap the heads (please note: this procedure varies considerably from one printer to another; some have no capping station; others you have to inject flush with a syringe).

Check with an experienced tech support person, but merely turning your UV printer on for a test print every few days is NOT what is meant by using your printer every day. It may be better to fill it with flush and not use it at all. But this depends on the plumbing system of your specific printer, so check with tech support: we are not a medical doctor for specific individual printing problems; just trying to get the message out: UV (and solvent) printers are designed to print; not to sit unused.

### 74. How should a printer be prepared for sitting unused for a long time?

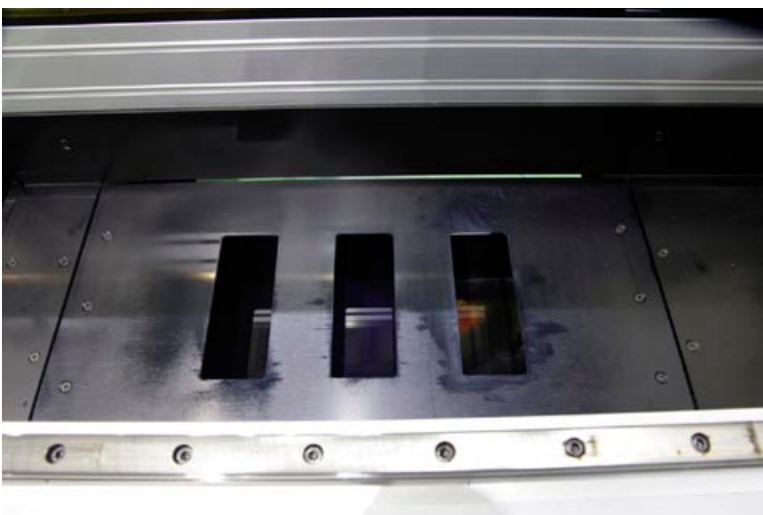
Solvent printers need to be used every day. Otherwise the ink dries in the nozzles and nozzle plate of the printheads. It was an early mantra that UV ink escaped all the problems of solvent printers: that you never had to weep (spit at the end of every pass); that you never had to purge; etc.

But in reality UV-curable ink has comparable issues, plus the added problem of curing inside the nozzles. Cationic ink can cure spontaneously (once initiated) all the way back into the ink tubes. Fortunately most printers don't use cationic ink; they use free-radical curing chemistry.

But reflected light can cure the ink inside the nozzles; heat can cause gellation which can clog the heads. So in some printers the heads are capped at night; in some printers you have to fill the ink lines with flush if you don't print frequently. Indeed a UV printer is intended to be used every day. We just received an e-mail from an end-user whose printer had endless issues. He said they used it seldom because of other issues. My first question was whether the infrequent use was a cause of at least some of the issues.



*This is another model, the 2030FRK, but the maintenance procedures are basically the same. You clean the printheads manually every day.*



*At the left, JETRIX 2513FRQ maintenance area.*



*Part of the maintenance is cleaning the ink waste bottle, very professional the way it is set into the printer.*





## PRINthead TECHNOLOGY

### ***75. Which brand printhead is used?***

Spectra Q-Class printheads.

Most UV printers made in the US, Japan, and Europe use Spectra, Ricoh, or KonicaMinolta heads. VUTEk is one of the few that uses Seiko printheads. It is reported that one downside of Seiko heads is that they must spit (which waste expensive ink). Most Rho printers do not have to spit except for white ink.

### ***76. Is the printhead identified in the spec sheet brochure by brand or also by model, or not at all?***

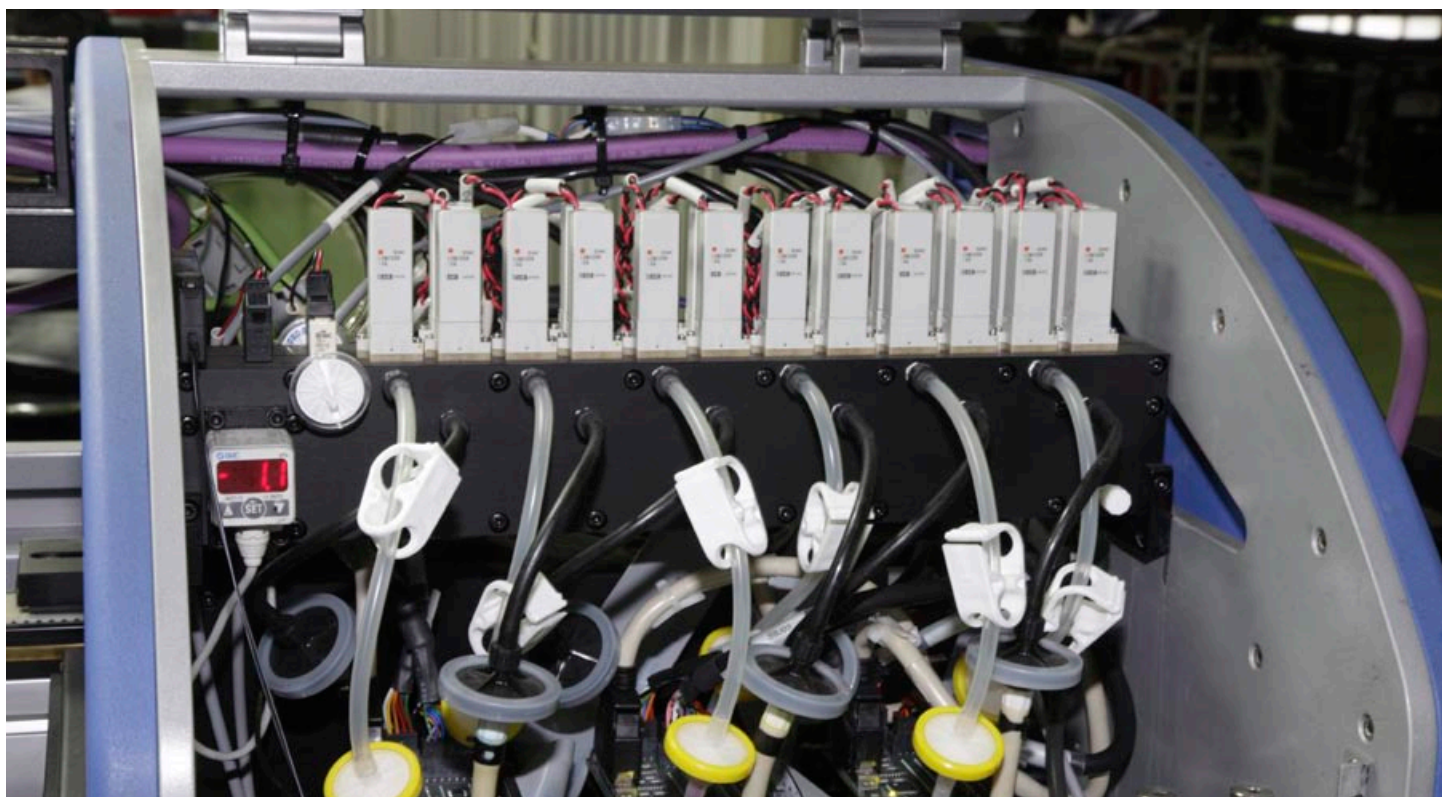
The brand is identified in the brochure. The model is identified in the printer model designation: the “Q” in JETRIX FQ stands for the model of the printhead.

### ***77. Is this a printhead adapted from solvent ink or a new design made especially for UV ink chemistry?***

The Spectra Q-Class printhead is relatively new. So the model used in UV printers is specifically designed for UV ink.

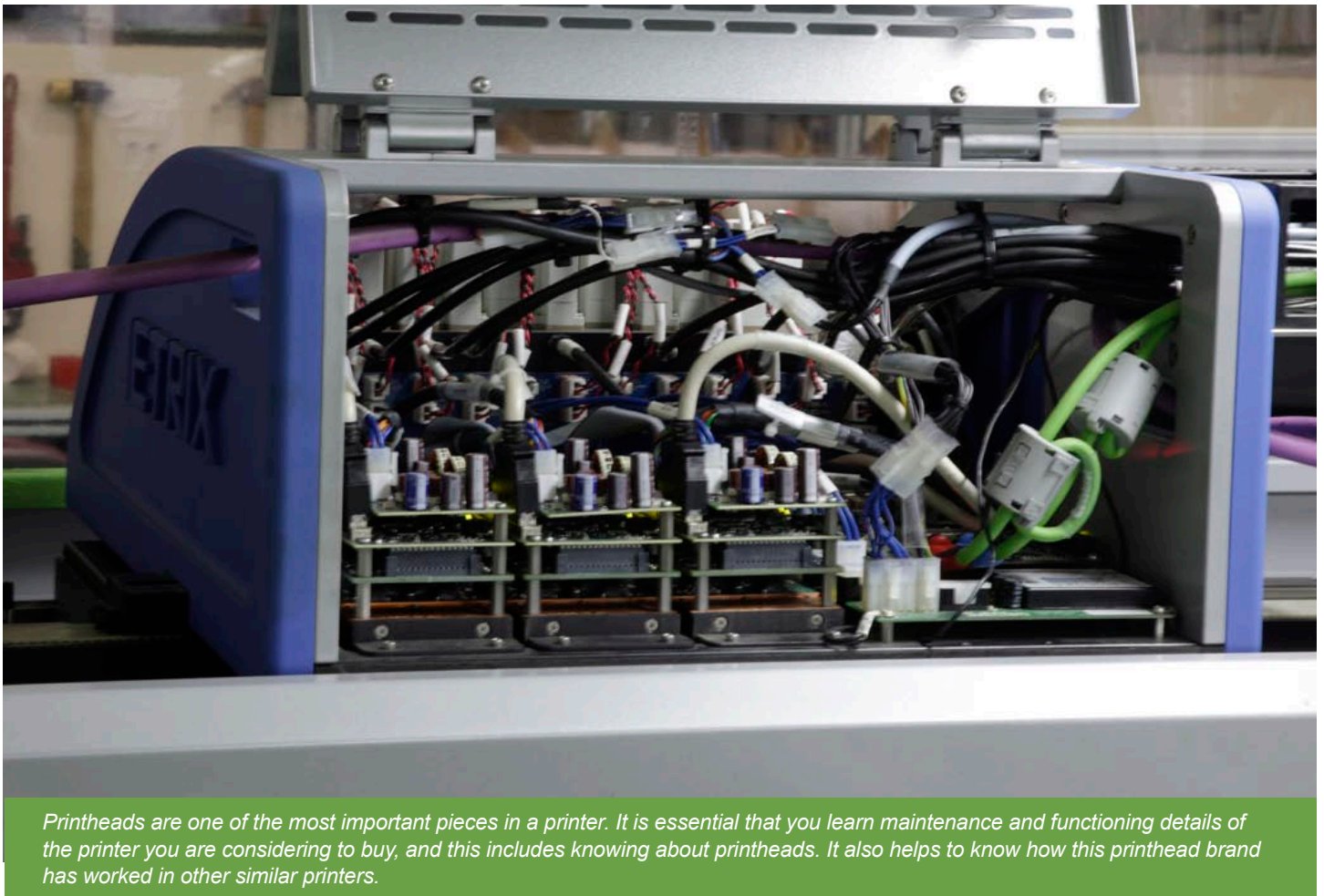
### ***78. How many other printers utilize the same printhead? Have they shown any problems?***

Durst Rho printers use exactly the same Spectra model than the JETRIX 2513 printer (10/20/30pl). The Polytype Virtu RS35/48, made in Switzerland also uses Spectra Q-Class. The new Novus Imaging Evo33 also uses Spectra Q-Class.



JETRIX 2513FRQ printhead carriage.





*Printheads are one of the most important pieces in a printer. It is essential that you learn maintenance and functioning details of the printer you are considering to buy, and this includes knowing about printheads. It also helps to know how this printhead brand has worked in other similar printers.*

## PRINTHEAD DPI & Features

### **79. How many passes can this printer achieve?**

The lower the number of passes, the faster the printer prints, but the lower the quality. At a printer's fastest rated speed, the output is usually unusable for most applications other than distant viewing for a billboard or banner. To achieve viewing quality for Point of Purchase or an honest photo quality, you generally need to set the number of passes at the highest number (which results in the slowest speed).

### **80. Does the software use passes or modes to describe quality levels?**

FLAAR prefers to use consistent terms that are standardized for all printers so that printshop owners, managers and printer operators have a fair chance of comparing speed vs quality. By not identifying the actual passes, or by defining pass in an atypical manner, this results, in effect, in hiding the reality of speed vs quality. Thus we commend those companies that keep to, or return to, the traditional usage of the term pass(es).

Increasingly most printer companies are not listing the passes that their printers run back and forth. The definition of a pass is not consistent in any event: FLAAR defines a single pass as the movement of the printer carriage, while jetting ink, from one side to the other. There is a difference between "single pass" and "one pass" but that needs an entire article (one pass means a page-width row of non-moving printheads).

Mutoh describes one pass as a complete back-and-forth movement (FLAAR defines that as two passes).

Most printer manufacturers would rather avoid having to state clearly how many actual passes it takes to achieve specific quality levels. So they create “modes” that are a combination of passes and possibly other features that result in a specific quality level.

## Bi-DIRECTIONAL VS Uni-DIRECTIONAL PRINTING

### *81. Which materials can be printed fast at 2-pass or 4-pass modes?*

The number of passes needed may also depend on how worn the printheads are. If the printheads are old you may need more passes than when the printheads are new.

## PRINthead Positioning

### *82. Are the printheads at an angle to the movement of the carriage, or at 90-degrees?*

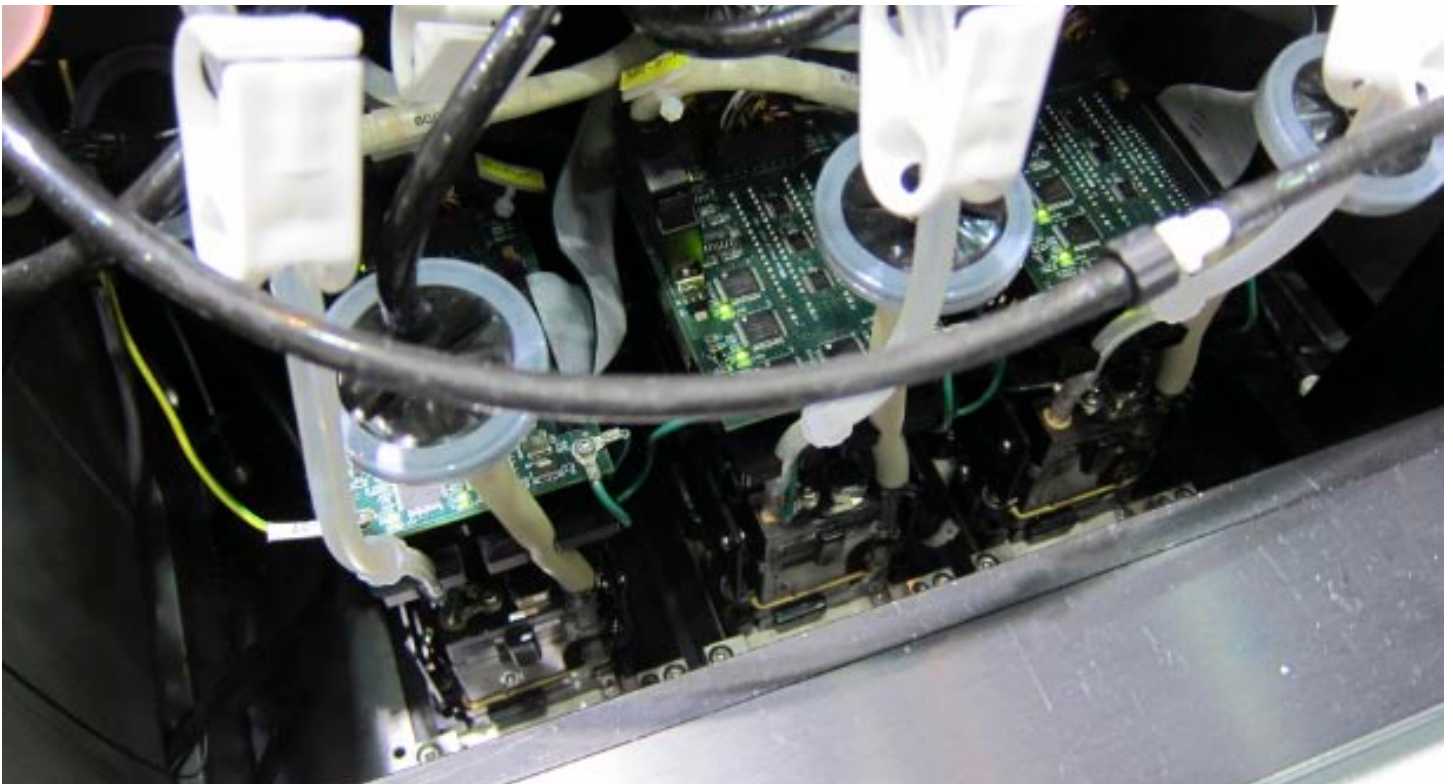
At 90-degrees, which is the normal position.

### *83. Are the printheads in a straight row, or staggered?*

The normal position for printheads is parallel to each other in a row. But there are exceptions, and staggered the positions may have other benefits. Each pattern for positioning the printheads has a reason, but most printheads are simply parallel to each other in one row.

### *84. Is there an alarm system to stop the head from hitting substrate if head is not high enough?*

Yes, there are two sensors below the printhead carriage; one for each side.



*The printheads are positioned at 90 degrees relative to the media. They are also aligned to each other.*

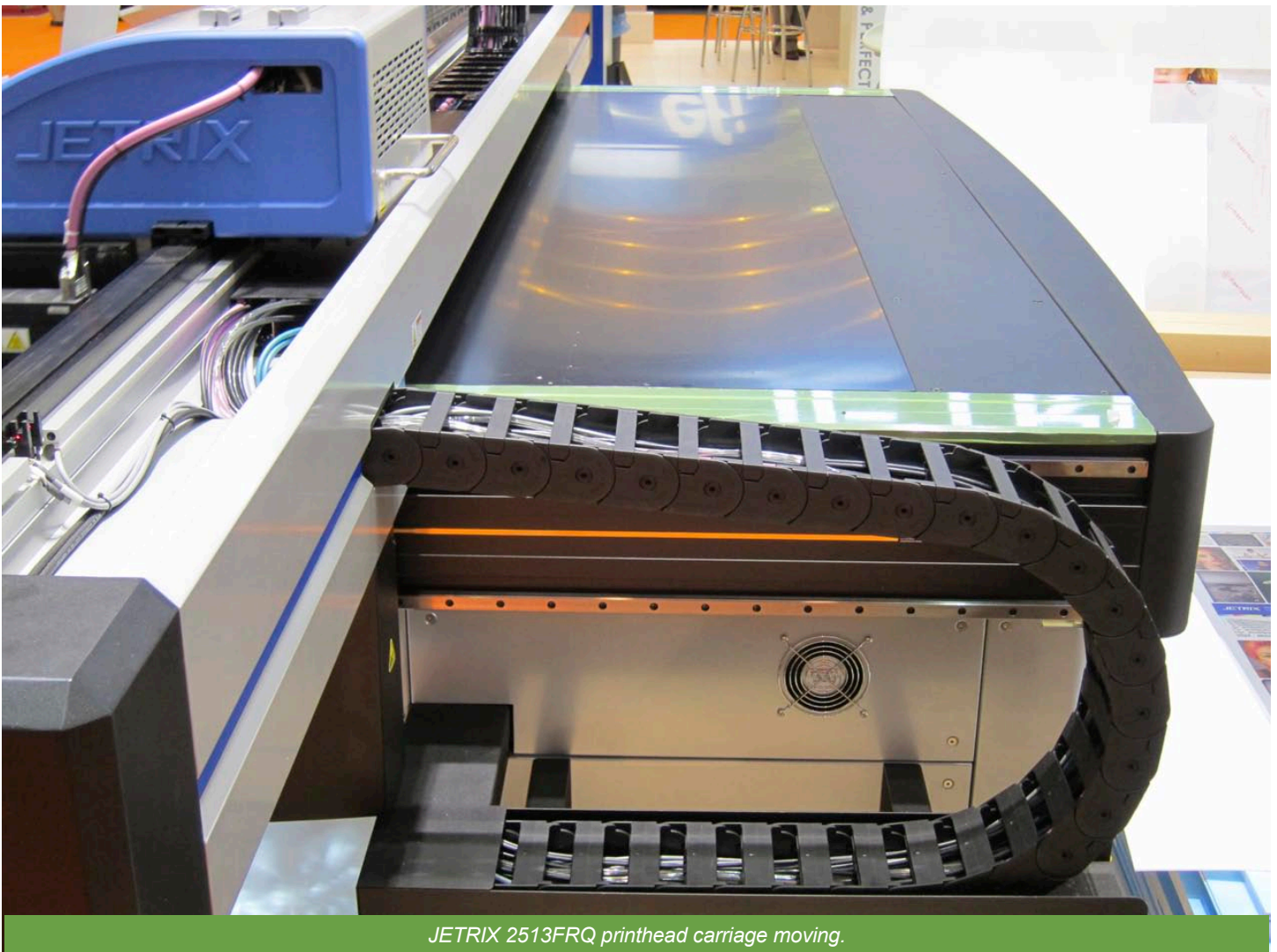


## MOTORS: Stepper, Linear, Magnetic?

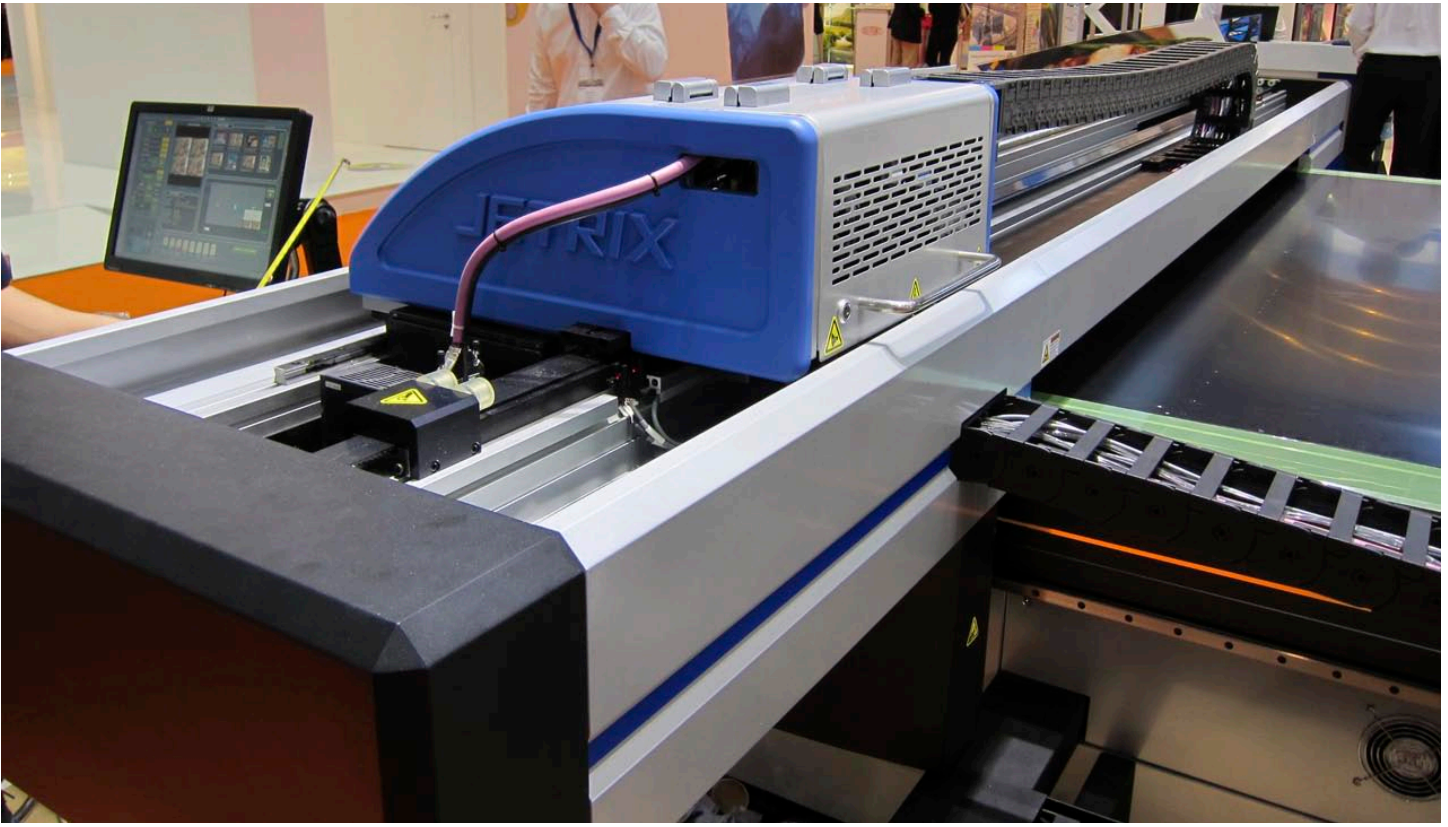


**85. Describe the motor and the system that moves the printhead carriage? Is the motor for the carriage a linear servo motor or a stepper motor?**

The only major UV printer brand that still uses an antiquated stepper motor is the Mimaki JF-flatbeds. A stepper motor moves the carriage (or other part of the printer), in steps of set distance. Downside is that they are not as accurate since they don't provide feedback that can be monitored and allow correction on the fly. The crucial advantage of a servo motor (usually an AC servo motor) is that it provides feedback and can correct its positioning. But since a servo motor is significantly more expensive, it is missing from many UV-curable printers.



JETRIX 2513FRQ printhead carriage moving.



## ELECTRONICS & FIRMWARE (Software)

### ***86. Is the dot pattern affected by the brand of circuit board or firmware that is used in this printer?***

It is essential in the future to check to see whether the dot pattern (laydown pattern of the inkjet droplets on the material) is adversely affected by the circuit board and firmware that is used in the printer. If the ink laydown has mottle or a splotchy mottle-like pattern, then this is a minor concern: not visible at billboard or banner viewing distances but noticeable on POS signage especially if backlit.

## SUBSTRATES

### ***87. What is the difference between media width and actual print width?***

We have this entry because some printers are called “3.2” because they accept substrates that are 3.2 wide, but the printer can actually print only 3.1 meters. In such a case the model name is misleading (and incorrect in a sense). I have even seen some model designations claiming 3.3 when they only hold media 3.2 meters. So there is a bit of misleading advertising out there.

### ***88. Can you adjust the rate of media feed?***

You need to adjust the rate of feed to remove banding lines caused by media feed that is slightly off. This is not entirely the fault of the printer but a result of the fact that each different kind of material feeds slightly differently.

## LOADING MEDIA

### ***89. Can you measure the height of the material with a sensor, or is it manual?***

The JETRIX printers have a laser sensor to measure media height, but JETRIX suggest to check media height manually because the thickness of some substrates might not be uniform.



**90. If you have to load a really long roll, are their clamps or any other system to allow you to secure the first portion so the first portion won't undo itself while you are several meters away trying to load the other end?**

The Durst Rho 351R has clamps so if only one person is available to load a long roll, he can clamp down the first portions that he feeds up and over into the platen area while he is still working on the other end of the roll to get that up and into the roll-feeding system.

## SUBSTRATES, Materials, Applications, and Issues

**91. What materials can this printer print on okay?**

It helps if the material is a clean, homogeneous surface, and should all be the same thickness.

**92. Heat concerns: will the heat generated by the UV curing lamps cause adverse effects to some delicate forms of heat-sensitive media? Which materials might curl, distort or discolor from the heat?**

Heat sensitive materials for mercury arc UV lamps would include polyethylene, polypropylene, shrink-wrap, very thin and thermal sensitive papers, plastic coated cartons, PVC and aluminum foil ([www.dotprint.com/fgen/prod1297.htm](http://www.dotprint.com/fgen/prod1297.htm)).

Oce lists several other common signage materials as sensitive to the heat of UV lamps. For these reasons we have a separate FLAAR Report on applications and materials.

Heat can build up when the printhead carriage hovers over a small area to print a narrow job. Heat can build up inside the printer as materials (especially metal) absorb heat and hold it (and then radiate it out for a long time). So heat is not only an issue from the obvious and immediate heat of the UV lamps. Residual heat can be an issue as well.



You can in effect lower the heat that reaches the material by raising the entire printhead carriage. However this results in noticeably less quality (because the ink is flying through the air a longer distance while the material is moving away from it). You can also set the printhead carriage to move further away from the printing area at the end of each pass (in those cases that the media is less than the maximum and in those cases where these settings are facilitated by the printer design and firmware). One way to dissipate heat is to have good ventilation drawing the hot air up and out of the enclosed printer. There are two exhaust tubes at the top for this purpose. These are not only to suck out the odor and ink mist, but to remove some of the heat too.





*Dr. Hellmuth examining the output quality of the JETRIX flatbed printer in a roll substrate.*



*The photograph of a caterpillar taken in Guatemala was used as a print sample during Dr. Hellmuth's visit. The result was outstanding.*



**93. What happens in very dry weather (low humidity), especially in winter with central heating?**

In low humidity static electricity may run through the substrates. To overcome this issue, JETRIX offers two optional items: an ionizer bar and a gun system to eliminate

During dry periods (with low humidity) static problems may increase. With a high static charge (such as with PVC materials), the ink is attracted to charged areas of the material. This results in overspray (ink laydown in unintended areas). Dust can be a problem in places and seasons with low humidity. This is one of several reasons why you should have humidity control in your printshop, to allow maintaining proper humidity level for optimum performance of your printer.

Static control is as much an issue with your printshop environment as it is with the pros and cons of the individual printer, though some machines handle static better than others

## SUBSTRATES: Cleaning, Priming, Preparation

**94. Do you have to brush off or otherwise clean each sheet of incoming material by hand before you print on it?**

For flat rigid material generally yes. The need to clean incoming materials is typical of any printer. Some materials have more detritus or dust or issues than other materials. And some suppliers offer better materials than others.

I rarely see any printer operator attempting to clean roll-fed materials.

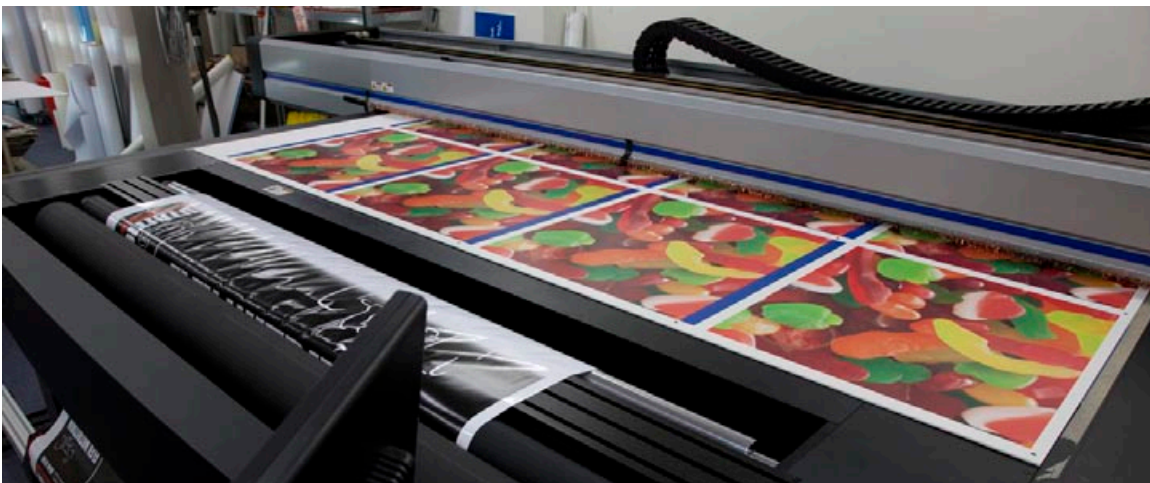
**95. Which substrates must be or ought to be prepared before printing by being corona treated? Corona treatment is to improve surface tension to promote adhesion.**

Corona treatment may help on some materials if you do the treatment within a few hours or day or so before printing. Otherwise the corona treatment wears out after a while, so has to be refreshed before printing to be effective. So buying pre-treated material is only a good idea if it is fresh (but you have no way to know how long the material was in a warehouse before reaching your shop).

**96. Which substrates ought to be laminated, top-coated, or otherwise post-treated?**

Realize that top-coating (a UV clearcoat) may be useful on some materials and even possibly required on some applications. This may require an additional machine, space, training, and further ventilation considerations. You are not protecting against the sun, you are protecting against the ink rubbing off slippery surfaces such as glass or marble.

Lamination can also serve to provide a glossy finish on a material that is naturally matte. Lamination will also cover up “lawnmower banding” appearance. This is caused by bi-directional printing.



*In general, most substrates that are not manufactured to be printed on, should be cleaned and dusted.*

## SUBSTRATES: General Concerns

**97. Although this printer “prints on almost all materials,” what is the adhesion rate with most materials? Does the ink easily scratch off certain materials?**

The JETRIX printer is one of the few UV-cured printers with an ink channel dedicated to jet primer. Using primer improves ink adhesion, especially on difficult materials such as glass and metals.

**98. What other problems in feeding exist? For heavy material? For light material?**

Perhaps the main advantage of a flatbed printer such as the JETRIX is that media is not fed, but is stationary. In other words, media does not move while being printed on.

On the other hand, other media mechanisms have issues with some substrates. Just realize that no transport belt on any combo-style design can feed all materials with the same precision. The system based on pinch rollers and grit rollers are perhaps the most inadequate media feeding mechanism to handle rigid substrates. FLAAR classifies these type of printers as hybrid. This system performs good enough with roll media, but only few hybrid printers handle rigid boards adequately. I can number at least 4 UV hybrid printers that have been phased out of the market because of feeding issues.

**99. How much acclimatization time is needed for the substrates?**

Depends on material (and temperature of storage area compared with temperature of the print room).

## APPLICATIONS

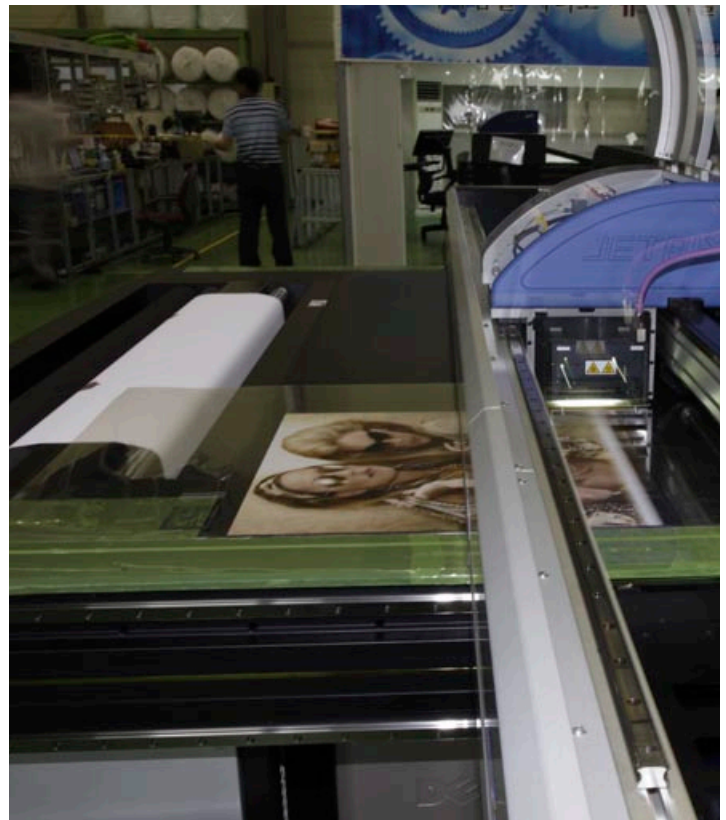
**100. Can you print on textiles or fabrics? How do you handle the ink that gets through the weave?**

There are two issues with printing on fabrics: first, the ink goes through the weave and ends up on the table or transport belt or platen. Second, the fibers from fabrics or mats can get onto the printhead nozzle plate and sometimes up into the nozzles.

**101. What other kinds of applications can you print?**

The biggest problem with UV-cured inks on vehicle graphics is when the material has to stretch or conform to the shape of the vehicle, especially over rivets, decorative trim, or anything that is not flat. Most UV printers are not recommended for vehicle wrap unless they use a special ink made to be flexible. Also be careful by making sure that adhesion and cleanser-resistance is adequate.

That said, today (2009) the inks are a lot better and you can consider experimenting with UV-curable vehicle wrap especially since 3M inks are specifically directed towards allowing vehicle wrap. Actually I have seen vehicles being wrapped with prints from GRAPO Octopus, using their normal UV ink.



*The most interesting of this kind of printers is that you can print on rigid and flexible materials. Here is JETRIX 2513FRQ printing on plexiglass.*





JETRIX 2513FRQ applications printed samples, really nice colors specialty golden colors on plexiglass.





*Ethno zoology photographs have been used in FLAAR's visit to test the output of printers at factories.*



## INK

### ***102. Is an extrudable or thermal-formable ink available from the printer manufacturer?***

In the past only Hexion and Gandinnovations offered a special heat-formable UV-cured ink. The Mimaki heat-formed samples are simply a basic generic flexible UV ink that they can stretch a bit; as of summer 2008 Mimaki was not yet using a real dedicated thermo-formable ink. Mimaki heat-formable ink may come from 3M.

At DRUPA 2008 (if I remember correctly), Durst announced that a heat-formable ink would be available for their Rho printers.

### ***103. What is shelf life of the ink (CMYK)?***

InkTec's ink is formulated to have a shelf life of one year, except for white, which has a shelf life of 6 months.

### ***104. What company makes the inks? Choices include DuPont (who could be considered as cheating by claiming the ink is theirs; it probably comes from Triangle), Jetrion (now InkWare/VUTEK), Hexion (now owned by Collins), Sericol, Sun, Triangle, KonicaMinolta, Toyo, AT Inks and several others.***

Easy to know where JETRIX gets its ink: from the ink manufacturer adjacent to them: InkTec.

### ***105. Does the printer manufacturer have its own ink chemists on staff?***

Since JETRIX is a brand of InkTec, an ink manufacturer, the company has its own ink chemists on staff. The advantage of a printer manufacturer that has its ink chemists is that the printer can be designed and improved based on first-hand comments of the chemists.

Durst, HP and comparable large printer manufacturers have their own ink chemists (even when they don't necessarily manufacture their own ink). But even when a company owns their own ink factory, sometimes they also rebrand the ink from completely different ink companies when they need an ink that they themselves do not yet make



*At front you see the sub-tanks. The main ink tanks are situated behind. These ink tanks are located in a cabinet at the right.*

## INK: White & Varnish

### ***106. To use white ink does that require not using light colors in order to make space for the white ink?***

The JETRIX printers have a stir circulation system in the main ink tank and a bypass system for white ink.

### ***107. Is the white ink opaque enough?***

The following is a general statement and is not directed at any specific company, but is based on inspecting printshops that have white ink installed. The majority of printshops with white ink installed report that white ink has innumerable issues and is not as realistic to use in your printshop as it is portrayed in a trade show booth or a printer manufacturer demo room.

I would not be convinced of the white ink of any company: whether European, US, or Japanese, until I have visited a print shop where it was functioning flawlessly over a several month period.

### ***108. Is the white ink tank situated in the same area as the other inks?***

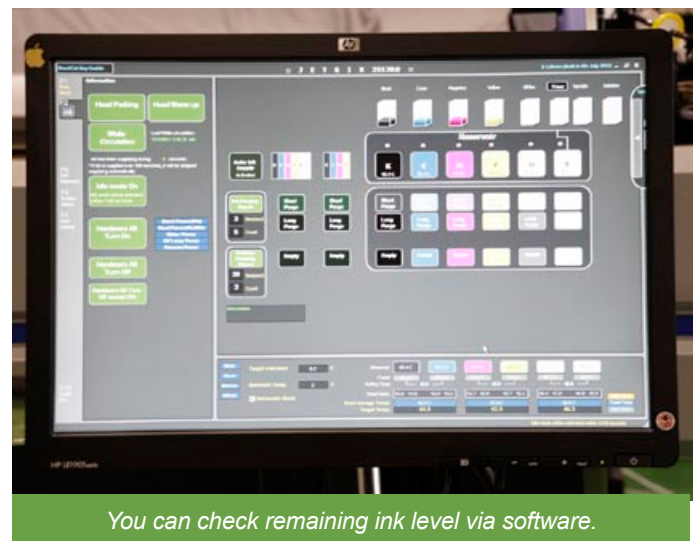
This question is in the FLAAR FAQs because the Zund 250 situated their white ink up inside the printhead carriage. If you have 500 features on a printer, 200 tend to be standard (similar solutions on most UV printers); another 200 are special or have a few tweaks, and one or two are unique.

## INK Cost

### ***109. Does the refill container of ink come in cartridge, bottles or bulk? How large are the ink containers for this replacement ink?***

Ink for the JETRIX printers comes in one litter bottles.

Ink tends to come either in bottles (where you pour the ink into the ink container on the printer) or containers that are themselves the ink container: you take the old one out; throw it away; and place the new container in its place. Cartridges tend to only be used in printers with Epson printheads. No currently functioning UV printer other than the narrow format Roland LEC-300 uses Epson printheads: one Eastech printer tried, but it is not widely used.



## INK: Longevity

### ***110. What is the longevity outdoors? What about in the full sun in direct sunlight?***

In some cases the ink may last longer than the material on which it is printed.

### ***111. What about solvents such as cleaning solvents? Do they mar, dull, or wash away the ink or change the surface quality, especially on vehicle wrap?***

- Ammonia (in Windex and comparable cleaning liquids)
- Acetone
- Cleaning alcohol
- Gasoline
- Soap and water with sponge
- Soap and water with a broom (frequently used to clean vehicle wraps in Latin America, for example)
- Scotch-tape pull-off test



## INK Color Gamut

### 112. Which colors print best?

Reds and Magentas are very good. Skin tones are also nice. I like the JETRIX blue at the bottom of every print sample.

Color gamut will depend on the color of the material on which you are printing, on your experience with color management, and whether you are using canned ICC color profiles or custom profiles that you made yourself.

### 113. What about silver or other metallics?

Gold color looks gorgeous. In general, the metallic colors of the samples at FESPA 2011 were really nice.

### 114. Which colors print poorly or not at all?

When you do test prints, try various reds; try a wide range of yellows and greens. Try a red-brown. These are colors which may present issues with other UV-cured inks. If these colors print well with the JETRIX, then you have a better-than-average ink.



FLAAR has collected photographs of print samples of the JETRIX printers in trade shows around the world. The color gamut is nice.

## THE UV CURING LAMPS

### 115. What brand of lamp is used?

JETRIX uses industry standard mercury arc lamps from the UK: Integration Technology Sub-Zero 85.

### 116. How many different sets of lamps are there? Is there pinning first and then curing later?

The JETRIX 2513FQ printer has two curing modes:

- Normal Curing, in which ink is solidified at the same time it reaches the media surface.
- Reverse Curing, in which ink is jetted on the first movement, and solidified on the second movement of the printhead carriage.

### 117. What technology is used in curing lamps: microwave, continuous (mercury arc), LED, or flash (pulsed Xenon)?

The JETRIX printers use mercury arc lamps.

Virtually all UV printers use mercury arc UV lamps. Only NUR and a few others use microwave UV lamps. Pulsed Xenon lamps have failed the few times they were tried (an early VUTEk UV printer circa 2000-2001; a cheap Oce Arizona 60uv printer).

LED lamps are now being tried in several UV printers, such as by Sun LLC (in Russia), Mimaki, and Roland. The Gerber Solara ion uses a rare type of long relatively cool UV lamp that is not used by any other wide-format inkjet printer manufacturer.

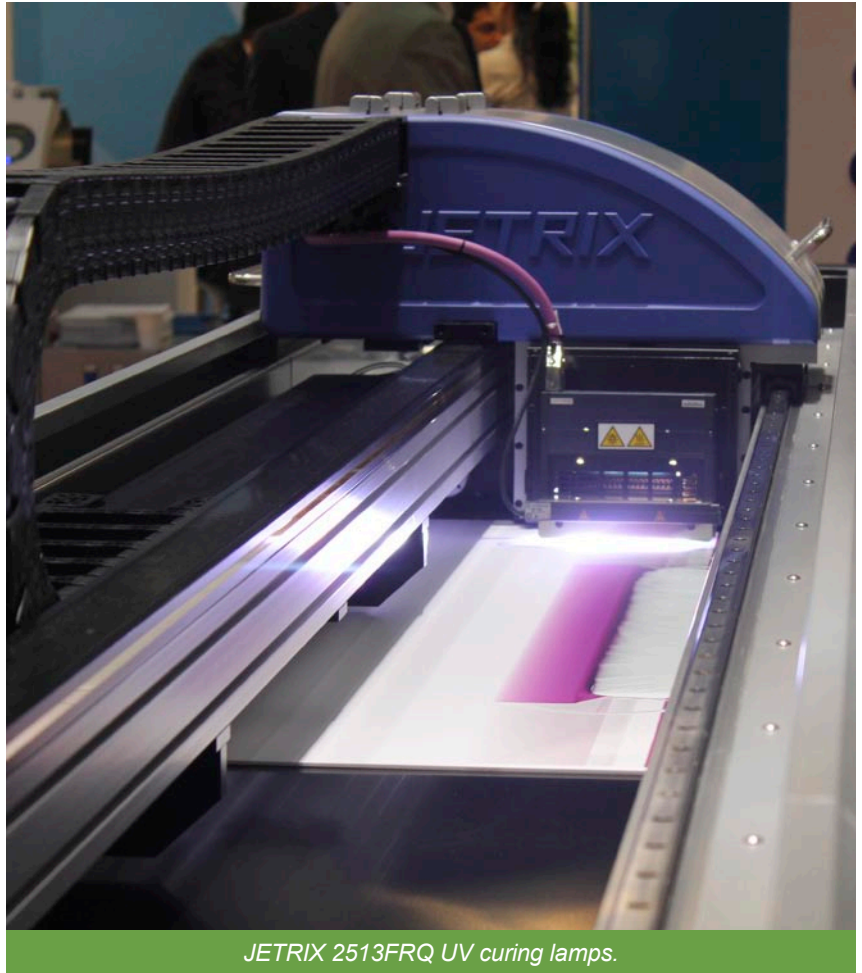
### 118. How many lamps does the printer use?

JETRIX has two lamps, which are plenty.

Most normal UV printers have two lamps, one for each direction of printing. Some cheap Chinese printers use only one lamp. Mimaki uses one lamp on several of their narrow-format UV printers to avoid the lawnmower effect that is caused by bi-directional printing (bi-directional print requires two lamps, one for each direction of ink laydown by the printer carriage). The Agfa :Anapurna 100 (a printer that was never finished due to being too complex), and its recent replacement, the :Anapurna XLS, have three sets of lamps: all curing, not for pinning. The Lüscher JetPrint, due to its über-dimensional size, may also have needed more than two lamps (whatever it had did not function fully adequately).

### 119. How long can the lamps stay on before they automatically shut off?

10 minutes is the default time on the JETRIX printers, but this can be set to last longer than 10 minutes.



JETRIX 2513FRQ UV curing lamps.



**120. What shuts the lamps off? For example, after so many minutes of not being used; or if they overheat?**

The lamps will go off if the printers go into Idle mode, which will happen if the printer is not used for 10 minutes, but this time can be modified. In fact, you can set the printer to Idle mode via software and decide whether the lamps will stay on or off.

This is a crucial question, and one seldom asked elsewhere: if your UV lamps need to be turned off after the printer being unused for 5 to 10 minutes, then your lamps' life gets used up quickly (if they are mercury arc). Each strike (turning the lamp off and on one time) can lower the life of the lamp by one or two hours. So ideally you want a kind of UV lamp system where the lamps can stay on as long as possible to avoid having to turn them off and on all day long.

Another downside of having to turn the lamps off too quickly is that you then have to let them cool down, and then have to let them heat up again. Most of these issues are with mercury arc lamps (due to their intense heat). You don't have these problems with LED lamps.

**121. What about shut-down sequence, shut-down time, and wait-time before restrike?**

When you turn off the lamps, a cooling system is activated for five minutes. After the cooling is completed, you can turn the UV lamp on again.

**122. How do you keep track of lamp-hours?**

Via software.

**123. Is the lamp fan filter a user-replaceable item? How often should this be cleaned or replaced?**

The UV lamp fan filter should be changed normally every week if necessary.

**124. How long does the lamp last, in terms of hours of operation?**

The lamps on the JETRIX printers will last an average of 500 hours.

Most lamps last 500 hours producing normal curing. You can use them past this life span but curing may be slower or less thorough.

## UV CURING, and ODOR of the printed image

**125. Are the UV lamp fixtures set at an angle or perfectly parallel to the printing plane?**

The lamps on the JETRIX flatbed printers are perfectly parallel to the printing plane.

**126. Is the ink still tacky when the print exits the printer?**

I have taken notes on the JETRIX printers since they exhibited in the USA for the first time in 2008, and the substrates have never felt tacky after being printed on.

I have seen this curing issue in models exhibited at APPPEXPO 2011.

**127. How much odor is emitted by a fresh print?**

JETRIX User's Manual clearly state that the lamps of their flatbed printers produce an ozone concentration of 0.05 ppm for 8 hours per 70m<sup>2</sup> (the permitted ozone concentration is in an average of 0.1 ppm), therefore, the document states you must use a ventilation system in the room where the printer was installed.

**128. What is the true drying (curing) time of the inks used with this set of lamps? What factors influence the true (total) drying time?**

No UV ink really cures within seconds. Some colors, depending on how thick the ink is laid down, may cure "instantly." But several factors may result in a cure that takes 24 hours, 48 hours, or weeks. If you set the print mode for "glossy" this reduces the lamp intensity. These prints will outgas for weeks.

**129. Is there any heater to assist in drying the inks (drying as opposed to curing)?**

I believe (if I remember correctly, I am writing this on a train from VISCOM Germany in Frankfurt, to inspect two UV printers in a printing company in Hamburg), the Mimaki LED-curing model 160 has a heater to assist curing; if not the Mimaki, then the Roland; one of the two appeared to have a heater.

But the JETRIX needs no heater assist.

## UV LAMPS: Cooling

### 130. Are there shutters?

Yes; Shutters help control light leak and save from having to turn the lamps off. So the lamps last a bit longer and you can be more productive, not having to wait for the lamps to cool down and then warm up all over again. But shutters are primarily for controlling the extreme heat of mercury arc UV curing lamps.

### 131. How often do the shutters stick?

The shutters on the Gandinnovations printer are pneumatic, so don't stick as often as mechanical shutters. DuPont Cromaprint 22uv printer seems to have issues with its shutters getting stuck (either stuck open or stuck shut). So DuPont had to switch to another solution. We occasionally hear of shutters of other brands of printers sticking as well. Indeed one company said they don't use shutters at all due to the possibility of them not opening or closing. Making them pneumatic resolves many of these issues. Of course one reason for not using shutters is to save cost. Most Chinese printers and low-cost UV printers made in the US and elsewhere may skip shutters.

But it may be safer to have no shutters at all rather than have shutters, then depend on them, and if they fail nonetheless, then the UV lamps can set the printer on fire.

### 132. How are the lamps cooled? Air? Fans? Water-cooled?

Fans.

### 133. How many fans are there per lamp?

Apparently there are two fans per lamp.

### 134. How many settings do the lamps have? Or are the fans just Off and On?

Full power or half power.

### 135. Are there fans elsewhere in the printhead carriage area?

There are no lamps needed elsewhere since you can easily operate the printer with the two lids (over the printhead carriage) raised up.

### 136. What other fans are there in the printer, or exhaust ports?

Yes, there are two fans on the doors of the body at the right.

### 137. How long does it take to cool the lamps down before you can touch them to change them?

The operator's instructions for the Durst Rho 800 Presto is the first user's manual where I have seen mention of how long you need to let the lamp cool down enough to touch it safely: they recommend one hour.



Integration Technology Sub-Zero is the brand and model of UV lamps used in the JETRIX 2513FRQ.



## UV LAMPS: Reflectors

### 138. Are the reflectors at an angle? What angle, and why?

A wrong direction would be light that reflected off the surface of the material up into the nozzle plate.

## RIP SOFTWARE & Printer Software

### 139. Which RIPs are featured?

Caldera, Onyx, Wasatch. JETRIX can also offer a driver for Ergo-Soft and Shiraz. JETRIX has its own driver. An ICC Profile building program for each RIP is an optional feature.

### 140. If a RIP is included or part of a package, is it a lite RIP or a full-featured RIP? Can this RIP be updated? Can it run any other printers?

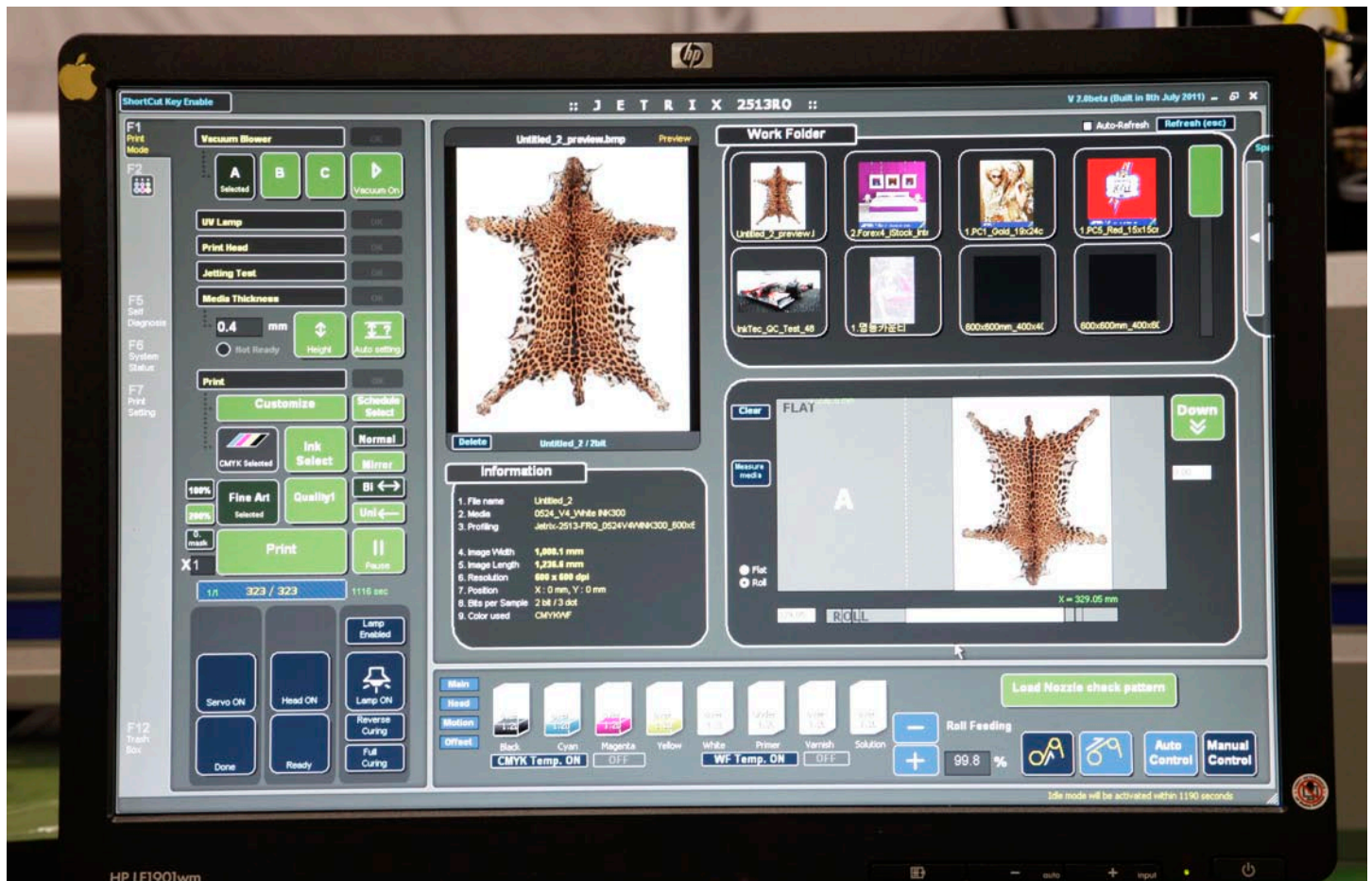
A lite RIP is included. No ICC profiles; you can purchase that option.

### 141. Is a computer and monitor included (to run the RIP)?

You buy your own computer and monitor to operate the RIP software.

### 142. What kind of monitor is included with the printer's computer?

The printer comes with a 17" monitor.



All the RIPs available for the JETRIX printers are mainstream. In other words, Caldera, Onyx, Wasatch, ErgoSoft and Shiraz are the not cheap RIPs and these brands are used in the best wide-format printers.



Another view of the information displayed in the monitor.

## COLOR MANAGEMENT FEATURES

### 143. What color management sensors or measuring tools are on-board?

ColorSpan has color management tools built into its UV printers, but otherwise this feature is not yet available on other brands of UV-curing wide-format inkjet printers.

## PRODUCTIVITY & ROI (Return on Investment)

### 144. Can you sell the output at the machine's fastest output speed or is the quality at that speed not acceptable to most client standards?

90% of the different brands of printers can't produce usable output at their fastest claimed speed. So I call these speeds "junk mode." It is false advertising in probably half the spec sheets.



## ADVERTISING CLAIMS:

### ***145. Do certain parts of the printer need to be repaired or accessed so often that you have to remove safety plates or protective plates to make access easier?***

This is mainly with Chinese-made printers. With this Korean printer you will not have to tear it apart often to repair things. And when you do need to access things inside (under the table) access to the back of the platform is easy.

### ***146. How often do people return this printer and say they want their money back?***

The most frequent cause of returns are when a printer has poor manufacturing quality, or when a printer PR releases promise more than the printer can deliver. Returns for breakdowns are mainly with Chinese-made printers. But printers from other countries break down as well.

The printer that is probably most frequently returned due to excessive advertising claims would be the latex printers. Printshops are agast when they find out all the things this printer can't print on.

But, any time you are seriously thinking of any printer it is essential to learn what the recall or return rate is. In other words: how many printshops return this printer because it is either not what they expected or not what they need.

This does not automatically mean that the printer is bad; it may mean that the printshop had an unrealistic expectation. Sometimes the printshop did not anticipate how much maintenance and care the printer needed in the evening and in the morning.

It is likely that every single brand out there has printers they have had to take back. But you ought to learn how many, and why.

If the manufacturer, distributor or reseller is honest and gives you the actual facts, this is a company to trust. If they say there have been no returns, this is statistically unlikely (but not impossible).



*Lateral view of the JETRIX flatbed printer. Notice how clean the factory is.*

## GENERAL CONSIDERATIONS

### 147. How many printers of this model are in use; in the USA; in the rest of the world?

As mentioned earlier, JETRIX has several distributors in important regions of the world. The following chart describe the quantity of printers sold as of October 2011.

JETRIX printer model	Number sold
2513FQ/FRQ	38
3015FQ	18
2030FK/FRK	2

### 148. What will the resale value of your printer be in three to five years?

If a printer manufacturer is weak, about to go out of business, or has an iffy reputation, the resale is close to zero.



A JETRIX flatbed printer model at a sign shop in Australia.

## SUMMARY: Image Quality Issues: Banding

### 149. Is there banding in areas of solid black?

JETRIX printers are printing most of the trade shows opening hours. While taking notes for this evaluation I did not notice any banding in the print samples.

Between 50% to 75% of all UV printers at a typical trade show exhibit at least bi-directional handing. Some printer booths cheat and set their printer on uni-directional mode. Normally this gets rid of bi-directional banding.

But you may also have banding from a nozzle being out. Or there may be banding from inaccurate feeding of the material or movement of the gantry between passes.



However the test prints we did on the JETRIX did not have noticeable banding. This is one of several reasons why this printer should be considered.

**150. What causes banding in this particular system?**

See above; but there may be other causes.

**151. How can banding be avoided?**

More passes tend to get rid of banding on almost any and all inkjet printers. Of course it helps if the machine is precision engineered so you don't get much banding at four passes and above. Banding at two passes is normal. You can eliminate pass-overlap banding by using an interweaving technique (which Mutoh developed and now Roland and others have copied).

So JETRIX uses gradient masking software technology, as well as an easy manner to adjust feeding rate-per-pass. Result is either unnoticeable banding or no banding.

**152. Does this printer have a gradient mask or other interweaving system? What do they call this system? How does it work?**

Mutoh was the first company to publicize this. Then Roland copied with a similar but slightly different technique. Gandinnovations also followed this trend. Now many companies use this clever trick. It does not get rid of the banding, it merely makes the banding harder to notice. JETRIX also offers gradient masking.

## SUMMARY: Image Quality Issues

**153. What about satellite drops which cause edge splatter?**

This issue is very rare in printers using Spectra Q-Class printheads. The print-heads are one of the reasons why the JETRIX printers have almost no printing issues.

Splatter of ink means droplets outside the intended area. Learning about satellite drops gets technical quickly. The ink, the ink delivery system, the printhead, and the selected printing mode may all affect whether or not you have satellite drops.



## CONCLUSIONS:

### *154. Are your customers satisfied with the print results from this UV-flatbed to the point that they recommend you by word of mouth to other potential clients?*

If you were really clever (and admittedly lucky) you may have bought the brand and model of printer that was perfect. Or even if not perfect, if the printer output satisfies your clients, this is the best advertisement for your printshop.

#### Pros

User friendly software. User friendly options. User control over the printer functions.

Distributors have tended to be consistent. With several other brands of printers the distributors have been distinctly inconsistent. For example; one distributor just dropped the brand he was importing from China and replaced it with a totally different brand. How can you obtain spare parts if this happens. So a consistent distributor is crucial.

It is a family-like atmosphere in the factory and demo room. The manufacturer is proud of their product and provides hospitality since they welcome printshop managers and owners and printer operators.

The printer is neither an ugly clunker, nor a cutie joke in design. The printer is engineered and designed as you would expect from Korea.

The User's Manual gives accurate information about potential hazards such as ozone emission of UV lamps, and clearly indicates that ventilation systems are mandatory.

This company has a better track record than any flatbed made in Japan, and a better track record than any flatbed made in China. There is only one flatbed made in Taiwan and the JETRIX appears more sophisticated and modern (JETRIX is not a CNC router company, so their printer is not in CNC router style as are Taiwan flatbeds).

Ink is dry to the touch when the print leaves the printing area. On too many other brands the ink is still tacky (sticky).

Ink has less odor than some other inks.

You can use a JETRIX printer 24 hours a day. Try using a cheap brand for more than a few hours: it will overheat and you will have to turn it off. Eventually a cheap brand will wear out.

#### Cons

Some people may prefer a pin registration system, or a bar registration system. Fortunately you can make and place a bar registration system yourself (besides, not all media is truly square anyway).

There may be a language issue if you need sophisticated tech support directly from the factory (yes, obviously your local distributor should provide tech support; but this is not always realistic for esoteric questions).

#### **If this printer is available used, should you consider it?**

Earlier models of some manufacturers were replaced because they had too many issues (the early Mimaki flatbed is an example; their sales value used is low). No such issue is known for an early JETRIX.

#### **Comments & Suggestions**

Printers that cost half a million dollars offer continuous options for lamp setting, or at least every 10 percent. This printer offers only full on and half on. Some materials and some print modes could possibly be easier if the lamps could be varied over a wider range.

**First issued  
November 2011**



## Reality Check

Being a university professor for many years does not mean we know everything. But intellectual curiosity often leads us to enter areas that are new to us. So we do not shirk from entering areas where we are obviously not yet expert. If in your years of wide format printing experience have encountered results different than ours, please let us know at [ReaderService@FLAAR.org](mailto:ReaderService@FLAAR.org). We do not mind eating crow, though so far it is primarily a different philosophy we practice, because since we are not dependent on sales commissions we can openly list the glitches and defects of those printers that have an occasional problem.

FLAAR and most universities have corporate sponsors but FLAAR web sites do not accept advertising, so we don't have to kowtow to resellers or manufacturers. We respect their experience and opinion, but we prefer to utilize our own common sense, our in-house experiences, the results from printshop site-visit case studies, and comments from the more than 53,000 of our many readers who have shared their experiences with us via e-mail (the Survey Forms).

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FLAAR Reports on UV-curable roll-to-roll, flatbed, hybrid, and combo printers are updated when new information is available. We tend to update the reports on new printers, on printers that readers ask about the most, and on printers where access is facilitated (such as factory visits, demo-room visits, etc).

Reports on obsolete printers, discontinued printers, or printers that not enough people ask about, tend not to be updated. Often we update the web page on a printer rather than the PDF version. So be sure to check the web page if you have a PDF of any year prior to 2011.

FLAAR still publishes individual reports on solvent printers, and on giclee printers, but we tend to write about new technologies and innovative inks.

## Please Note

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Also, since this report is frequently updated, if you got your version from somewhere else, it may be an obsolete edition. FLAAR reports are being updated all year long, and our comment on that product may have been revised positively or negatively as we learned more about the product from end users.

If you receive any FLAAR Report from a sales rep, in addition to being violation of copyright, it is useful to know if there is a more recent version on the FLAAR web site, because every month new UV printers are being launched. So what was good technology one month, may be replaced by a much better printer elsewhere the next month.

To obtain a legitimate copy, which you know is the complete report with nothing erased or changed, and hence a report with all the original description of pros and cons, please obtain your original and full report straight from [www.large-format-printers.org](http://www.large-format-printers.org) or other pertinent FLAAR web sites.

Your only assurance that you have a complete and authentic evaluation which describes all aspects of the product under consideration, benefits as well as deficiencies, is to obtain these reports directly from FLAAR, via [www.wide-format-printers.NET](http://www.wide-format-printers.NET).

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Inclusion in this study by itself in no way endorses any printer, media, ink, RIP or other digital imaging hardware or software. Equally, exclusion from this study in no way is intended to discredit any printer, ink, media, or product.

## Advisory

We do our best to obtain information which we consider reliable. But with hundreds of makes and models of printers, dozens of kinds of ink, and sometimes when information about them is sparse, or conflicting, we can only work with what we have available. Thus you should be sure to rely also on your own research, especially asking around. Find a trustworthy end-user of the same make and model you need to know about. If you are thinking of an after-market ink, be sure you speak with another printer operator to find out how this ink has worked for them.

Do not make a decision solely on the basis of a FLAAR report because your situation may be totally different than ours. Or we may not have known about, and hence not written about, one aspect or another which is crucial before you reach your decision. It is not realistic to update all the old reports, so if the report was written before 2011, it is all the more essential to check with end-users. And for inks and media, one chemical could be off in one batch. There is no way to keep track of every manufacturing run of each ink. Even major Japanese corporations have an occasional bad run of ink, or a bad series of printers. While on the subject of ink, realize that even OEM ink factories occasionally have a bad batch of ink. What counts is that when this happens that the ink company apologizes and replaces the ink if this is appropriate. It is not realistic for us to keep track of every batch of each ink company: some ink companies make dozens or even hundreds of different inks every month. What we do keep track of, however, is the long term track record of a company.

The sources and resources we may list are those we happen to have read. There may be other web pages or resources that we missed. For those pages we do list, we have no realistic way to verify the veracity of all their content. Use your own common sense plus a grain of salt for those pages which are really just PR releases or outright ads.

We are quite content with the majority of the specific printers, RIPs, media, and inks we have in the FLAAR facilities. We would obviously never waste our time learning about a hardware, software, or consumables that we knew in advance would not be good. However even for us, a product which looks good at a trade show, sounds good in the ad literature, and works fine in a factory or distributor demo room, may subsequently turn out to be a lemon under real-world conditions out in a printshop.

Plus, whether or not the end-user is trained to properly utilize the product effects whether the product works acceptably, or not. So the end-user we inspect may later learned to be atypical due to being really well trained, or have inadequate training.

Or the product may indeed have a glitch but one that is so benign for us, or maybe we have long ago gotten used to it and have a workaround. And not all glitches manifest themselves in all situations, so our evaluator may not have been sufficiently affected that he or she made an issue of any particular situation. Yet such a glitch that we don't emphasize may turn out to be adverse for your different or special application needs.

Equally often, what at first might be blamed on a bad product, often

turns out to be a need of more operator experience and training. More often than not, after learning more about the product it becomes possible to produce what it was intended to produce. For this reason it is crucial for the FLAAR team and their university colleagues to interact with the manufacturer's training center and technicians, so we know more about a hardware or software. Our evaluations go through a process of acquiring documentation from a wide range of resources and these naturally include the manufacturer itself. Obviously we take their viewpoints with a grain of salt but often we learn tips that are worthy of being passed along.

FLAAR has no way of testing 400+ specifications of any printer, much less the over 101 different UV printers from more than 46 manufacturers. Same with hundreds of solvent printers and dozens of water-based printers and the outpouring of new textile printers. We observe as best we can, but we cannot take each printer apart to inspect each feature. And for UV printers, these are too expensive to move into our own facilities for long-range testing, so we do as best as is possible under the circumstances. And when a deficiency does become apparent, usually from word-of-mouth or from an end-user, it may take time to get this written up and issued in a new release.

Another reason why it is essential for you to ask other printshop owners and printer operators about how Brand X and Y function in the real world is that issues may exist but it may take months for these issues to be well enough known for us to know the details. Although often we know of the issues early, and work to get this information into the PDFs, access to information varies depending on brand and model. Plus with over 300 publications, the waiting time to update a specific report may be several months. Plus, once a printer is considered obsolete, it is not realistic to update it due to the costs involved. If you received a FLAAR PDF from a sales rep, they may give you an early version; perhaps there is a later version that mentions a defect that we learned about later.

For these reasons, every FLAAR Report tries to have its publication date on the front outside cover (if we updated everything instantly the cost would be at commercial rates and it would not be possible to cover these expenses). At the end of most FLAAR Reports there is additionally a list of how many times that report has been updated. A report with lots of updates means that we are updating that subject based on availability of new information. If there is no update that is a pretty good indication that report has not been updated! With 101 models of UV printers, several hundred solvent printers, and scores of water-based printers, we tend to give priority to getting new reports out on printers about which not much info at all is available elsewhere. So we are pretty good about reporting on advances in LED curing. But glitches in a common water-based printer will take longer to work its way through our system into an update, especially if the glitch occurs only in certain circumstances, for example, on one type of media. With several hundred media types, we may not yet have utilized the problem media. While on the subject of doing your own research, be sure to ask both the printer operator and printshop owner or manager: you will generally get two slightly different stories. A printer operator may be aware of more glitches of the printer than the owner.

If a printer is no longer a prime model then there is less interest in that printer, so unless a special budget were available to update old reports, it is not realistic to update old reports. As always, it is essential for you to visit printshops that have the printers on your short-list and see how they function in the real world.

But even when we like a product and recommend it, we still can't guarantee or certify any make or model nor its profitability in use because we don't know the conditions under which a printer system might be



utilized in someone else's facility. For ink and media, especially after-market third-party ink and media, it is essential that you test it first, under your conditions. We have no way to assure that any ink or media will be acceptable for your specific needs in your specific print shop.

It is also crucial to realize that an ink (that we inspect, that works well where we inspect it), your printer, your printhead, the heat, humidity and dust conditions in your printshop, may cause that ink to react differently in your printer. And, there are different batches of ink. Even in the really big multi-national billion-dollar ink companies, occasionally one batch will have issues. There are over 100 ink companies; six colors per company, many flavors of ink per company per color. We have no realistic manner of testing each ink.

The same is true of media and substrates. One production run can have a glitch: chemical or physical, even in the best of companies. About six years ago, a major Swiss-owned media company, for example, had several months of media which were almost unusable (turned out they were rebranding media from China). Yet other kinds of media from the same company are okay (though we stopped using that brand and stopped recommending them after all the issues we ourselves experienced).

As a result, products are described "as is" and without warranties as to performance or merchantability, or of fitness for a particular purpose. Any such statements in our reports or on our web sites or in discussions do not constitute warranties and shall not be relied on by the buyer in deciding whether to purchase and/or use products we discuss because of the diversity of conditions, materials and/or equipment under which these products may be used. Thus please recognize that no warranty of fitness or profitability for a particular purpose is offered.

The user is advised to test products thoroughly before relying on them. We do not have any special means of analyzing chemical contents or flammability of inks, media, or laminates, nor how these need to be controlled by local laws in your community. There may well be hazardous chemicals, or outgassing that we are not aware of. Be aware that some inks have severe health hazards associated with them. Some are hazardous to breathe; others are hazardous if you get them on your skin. For example, some chemicals such as cyclohexanone do not sound like chemicals you want to breathe every day. Be sure to obtain, read, and understand the MSDS sheets for the inks, media, and laminates that you intend to use. Both solvent, eco-solvent, and UV-curable inks are substances whose full range of health and environmental hazards are not yet fully revealed. It is essential you use common sense and in general be realistic about the hazards involved, especially those which are not listed or which have not yet been described. FLAAR is not able to list all hazards since we are not necessarily aware of the chemical components of the products we discuss. Plus, there is no realistic way to know if all MSDS sheets are honest to begin with! Our reports are on usability, not on health hazards.

Most inks are clearly not intended to be consumed. Obviously these tend to be solvent inks and UV-curable inks. Yet other inks are edible, seriously, they are printed on birthday cakes. Indeed Sensient is a leader in a new era of edible inks. Therefore the user must assume the entire risk of ascertaining information on the chemical contents and flammability regulations relative to inks, media or laminates as well as using any described hardware, software, accessory, service, technique or products.

We have no idea of your client's expectations. What students on our campus will accept may not be the same as your Fortune 500 clients. In many cases we have not ourselves used the products but are basing our discussion on having seen them at a trade show, during visiting a print shop, or having been informed about a product via e-mail or other communication.

## Results you see at trade shows may not be realistic

Be aware that trade show results may not be realistic. Trade shows are idealized situations, with full-time tech support to keep things running. The images at a trade show may be tweaked. Other images may be "faked" in the sense of slyly putting on primer without telling the people who inspect the prints. Most UV inks don't stick to all materials; many materials need to be treated.

Or the UV prints may be top-coated so that you can't do a realistic scratch test.

Booth personnel have many standard tricks that they use to make their output look gorgeous. In about half the cases you will not likely obtain these results in real life: in most cases they are printing uni-directional, which may be twice as slow as bi-directional.

Trade show examples tend to be on the absolutely best media. When you attempt to save money and use economy media you will quickly notice that you do not get anywhere near the same results as you saw in the manufacturer's trade show booth, or pictured in their glossy advertisement. Five years ago we noticed Epson was laminating prints to show glossy output because their pigmented inks could not print on actual glossy media. The same equipment, inks, media, and software may not work as well in your facility as we, or you, see it at a trade show. All the more reason to test before you buy; and keep testing before you make your final payment. Your ultimate protection is to use a gold American Express credit card so you can have leverage when you ask for your money back if the product fails.

Images printed at trade show may be in uni-directional mode: so you may not realize the printer has bi-directional (curing) banding defects until you unpack it in your printshop. Bi-directional curing banding is also known as the lawnmower effect. Many printers have this defect; sometimes certain modes can get rid of it, but are so slow that they are not productive.

You absolutely need to do print samples with your own images and the kind provided by your clients. Do not rely on the stock photos provided by the printer, ink, media, or RIP manufacturer or reseller. They may be using special images which they know in advance will look fabulous on their printer. Equally well, if you send your sample images to the dealer, don't be surprised if they come back looking awful. That is because many dealers won't make a serious effort to tweak their machine for your kind of image. They may use fast speed just to get the job done (this will result in low quality). Check with other people in your area, or in the same kind of print business that you do. Don't rely on references from the reseller or manufacturer (you will get their pet locations which may be unrealistically gushy): find someone on your own.

Results you see in a manufacturer's or master distributor's demo room may not be realistic

We are learning that what you see in a demo room may not be what performance you will receive in your own printshop. The temperature, humidity, and air quality in your city may be totally different than the skillfully controlled conditions in a demo room.

And, many printers look great when they are new and in a demo room. But once the ink has been flowing through the ink delivery system and printheads for several months, you may experience issues that were not observable in the demo room. In other words, a report based on demo room observations is a first step. YOU still need to check with end-users to learn the difference between performance in the demo room and performance out in the real world.

## Factors influencing output

Heat, humidity, static, dust, experience level of your workers (whether they are new or have prior years experience): these are all factors that will differ in your place of business as compared with test results or demo room results.

Actually you may have people with even more experience than we do, since we deliberately use students to approximate newbies. FLAAR is devoted to assisting newcomers learn about digital imaging hardware and software. This is why Nicholas Hellmuth is considered the “Johnny Appleseed” of wide format inkjet printers.

Therefore this report does not warranty any product for any quality, performance or fitness for any specific task, since we do not know the situation in which you intend to use the hardware or software. Nor is there any warranty or guarantee that the output of these products will produce salable goods, since we do not know what kind of ink or media you intend to use, nor the needs of your clients. A further reason that no one can realistically speak for all aspects of any one hardware or software is that each of these products may require additional hardware or software to reach its full potential.

For example, you will most likely need a color management system which implies color measurement tools and software. To handle ICC color profiles, you may need ICC color profile generation software and a spectrophotometer since often the stock pre-packaged ICC color profiles which come with the ink, media, printers and/or RIPs may not work in your situation. Not all RIPs handle color management equally, or may work better for some printer-ink-media combinations than for others. Please be aware that our comments or evaluations on any after-market ink would need the end-user to use customized ICC profiles (and not merely generic profiles).

Be aware that some RIPs can only accept ICC color profiles: you quickly find out the hard way that you can't tweak these profiles nor generate new ones. So be sure to get a RIP which can handle all aspects of color management. Many RIPs come in different levels. You may buy one level and be disappointed that the RIP won't do everything. That's because those features you may be lacking are available only in the next level higher of that RIP, often at considerable extra cost. Same thing in the progression of Chevy through Pontiac to Cadillac, or the new Suburbans. A Chevy Suburban simply does not have all the bells and whistles of the Cadillac Escalade version of this SUV.

Don't blame us... besides, that's why we are warning you. This is why we have a Survey Form, so we can learn when you find products that are inadequate. We let the manufacturers know when end users complain about their products so that the manufacturers can resolve the situation when they next redesign the system.

Most newer printer models tend to overcome deficiencies of earlier models. It is possible that our comparative comments point out a glitch in a particular printer that has been taken care of through an improvement in firmware or even an entirely new printer model. So if we point out a deficiency in a particular printer brand, the model you may buy may not exhibit this headache, or your kind of printing may not trigger the problem. Or you may find a work-around.

Just remember that every machine has quirks, even the ones we like. It is possible that the particular kind of images, resolution, inks, media, or other factors in your facility are sufficiently different than in ours that a printer which works just fine for us may be totally unsatisfactory for you and your clients. However it may be that the specific kind of printing you need to do may never occasion that shortcoming. Or, it may be that your printer was manufactured on a Monday and has defects that are

atypical, show up more in the kind of media you use which we may not use as often or at all during our evaluations. Equally possibly a printer that was a disaster for someone else may work flawlessly for you and be a real money maker for your company.

So if we inspect a printer in a printshop (a site-visit case study), and that owner/operator is content with their printer and we mention this; don't expect that you will automatically get the same results in your own printshop.

In some cases a product may work better on a Macintosh than on a PC. RIP software may function well with one operating system yet have bugs and crash on the same platform but with a different operating system. Thus be sure to test a printer under your own specific work conditions before you buy.

And if a printer, RIP, media, or ink does not function, return it with no ands, ifs or buts. Your best defense is to show an advertising claim that the printer simply can't achieve. Such advertising claims are in violation of federal regulations, and the printer companies know they are liable for misleading the public.

But before you make a federal case, just be sure that many of the issues are not user error or unfamiliarity. It may be that training or an additional accessory can make the printer do what you need it to accomplish. Of course if the printer ads did not warn you that you had to purchase the additional pricey accessory, that is a whole other issue. Our reviews do not cover accessories since they are endless, as is the range of training, or lack thereof, among users.

The major causes of printer breakdown and failure is lack of maintenance, poor maintenance, spotty maintenance, or trying to jerry-rig some part of the printer. The equally common cause of printer breakdown is improper use, generally due from lack of training or experience. Another factor is whether you utilize your printer all day every day. Most solvent and UV printers work best if used frequently. If you are not going to use your printer for two or three days, you have to put flush into the system and prepare it for hibernation (even if for only four or five days). Then you have to flush the ink system all over again.

Also realize that the surface of inkjet prints are fragile and generally require lamination to survive much usage. Lamination comes in many kinds, and it is worth finding a reliable lamination company and receiving training on their products.

Also realize that no hybrid or combo UV printer can feed all kinds of rigid materials precisely. Some materials feed well; others feed poorly; others will skew.

Although we have found several makes and models to work very well in our facilities, how well they work in your facilities may also depend on your local dealer. Some dealers are excellent; others just sell you a box and can't provide much service after the sale. Indeed some low-bid internet sales sources may have no technical backup whatsoever. If you pay low-bid price, you can't realistically expect special maintenance services or tech support later on from any other dealer (they will tell you to return to where you paid for the product). This is why we make an effort to find out which dealers are recommendable. Obviously there are many other dealers who are also good, but we do not always know them. To protect yourself further, always pay with a level of credit card which allows you to refuse payment if you have ended up with a lemon. A Gold American Express card allows you to refuse payment even months after the sale. This card may also extend your warranty agreement in some cases (check first).

Most of the readers of the FLAAR Reports look to see what printers we use in our own facilities. Readers realize that we will have selected the



printers that we like based on years of experience and research. Indeed we have met people at trade shows who told us they use the FLAAR web site reports as the shopping list for their corporate purchases.

Yes, it is rather self-evident that we would never ask a manufacturer to send a product which we knew in advance from our studies was no good. But there are a few other printers which are great but we simply do not have them in our facilities yet.

So if a printer is not made available by its manufacturer, then there is no way we can afford to have all these makes and models in our facility. Thus to learn about models which we do not feature, be sure to ask around in other print shops, with IT people in other corporations, at your local university or community college. Go to trade shows....but don't use only the booth...ask questions of people in the elevator, in line at the restaurant, anywhere to escape the smothering hype you get in the booth.

Realize that a FLAAR Report on a printer is not by itself a recommendation of that printer. In your local temperature, in your local humidity, with the dust that is in your local air, with your local operator, and with disorientation of the insides of a printer during rough shipment and installation, we have no knowledge of what conditions you will face in your own printshop. We tend to inspect a printer first in the manufacturing plant demo room: no disjointed parts from any shipment since this printer has not been lifted by cranes and run over a rough pot-holed highway or kept in smeltering heat or freezing cold during shipment.

Taking into consideration we do not know the conditions in which you may be using your hardware, software, or consumables, neither the author nor FLAAR nor either university is liable for liability, loss or damage caused either directly or indirectly by the suggestions in this report nor by hardware, software, or techniques described herein because.

## **Availability of spare parts may be a significant issue**

Chinese printers tend to switch suppliers for spare parts every month or so. So getting spare parts for a Chinese printer will be a challenge even if the distributor or manufacturer actually respond to your e-mails at all. Fortunately some companies to have a fair record of response; Teckwin is one (based on a case of two problematical hybrid UV printers in Guatemala). The distributor said that Teckwin sent a second printer at their own expense and sent tech support personnel at their expense also. But unfortunately both the hybrid UV printers are still abandoned in the warehouse of the distributor; they were still there in January 2009. But Teckwin has the highest rating of any Chinese company for interest in quality control and realization that it is not good PR to abandon a client or reseller or distributor all together.

Recently we have heard many reports of issues of getting parts from manufacturers in other countries (not Asia). So just because your printer is made in an industrialized country, if you are in the US and the manufacturer is X-thousand kilometers or miles away, the wait may be many days, or weeks.

## **Lack of Tech Support Personnel is increasing**

The recession resulted in tech support issues: some manufacturers may need to skimp on quality control during a recession, or switch to cheaper parts suppliers. Plus they are not hiring enough tech support during a recession. So the bigger and more successful the company, in some cases the worse these particular problems may be.

## **Any new printer may take a few months to break in**

Any new printer, no matter who the manufacturer, or how good is the engineering and electronics, will tend to have teething issues. Until the firmware is updated, you may be a beta tester. This does not mean the printer should be avoided, just realize that you may have some downtime and a few headaches. Of course the worst case scenario for this was the half-million dollar LUSCHER JetPrint: so being "Made in Switzerland" was not much help.

## **Counterfeit parts are a problem with many printers made in China**

Several years ago many UV printers made in China and some made elsewhere in Asia had counterfeit parts. No evaluation has the funding available to check parts inside any printer to see if they are from the European, Japanese, or American manufacturer, or if they are a clever counterfeits.

## **Be realistic and aware that not all materials can be printed on equally well**

Many materials don't feed well through hybrid (pinch roller on grit roller systems) or combo UV systems (with transport belts). Banding, both from poor feeding, and from bi-directional (lawnmower effect) are common on many UV-curable inkjet printers.

It is typical for some enthusiastic vendors to claim verbally that their printer can print on anything and everything. But once you unpack the printer and set it up, you find that it requires primer on some materials; on other materials it adheres for a few weeks but then falls off.

And on most hybrid and many combo printers, some heavy, thick, or smooth-surfaced materials skew badly. Since the claim that the printer will print on everything is usually verbal, it is tough to prove this aspect of misleading advertising to a jury.

Not all inks can print on all materials. And at a trade show, many of the materials you see so nicely printed on, the manufacturer may be adding a primer at night or early in the morning: before you see the machine printing on this material.

We feel that the pros and cons of each product speak more than adequately for themselves. Just position the ad claims on the left: put the actual performance results on the right. The unscrupulous hype for some printers is fairly evident rather quickly.

## **Be sure to check all FLAAR resources**

Please realize that with over 200 different FLAAR Reports on UV printers, you need to be sure to check the more obscure ones too. If a printer has a printhead issue, the nitty gritty of this may be in the FLAAR Report on printheads. The report on the model is a general introduction; if we discussed the intimate details of printheads then some readers might fall asleep. And obviously do not limit yourself to the free reports. The technical details may be in the reports that have a price to them. Our readers have said they prefer to have the general basics, and to park the real technical material in other reports that people can buy if they really want that level of information.

So it may be best to ask for personal consulting. The details of the problems with the ColorSpan 5400uv series are rather complex: namely

the center row of the Ricoh printheads. This would require an expensive graphic designer and consultants to show the details. And the design of the printhead would probably be altered by the time we did any of this anyway. So it is essential to talk with people: with other end-users, and with FLAAR in person on a consulting basis.

## Acknowledgements

With 15 employees the funding has to come from somewhere, so we do welcome project sponsorship, research grants, contributions that facilitate our educational programs, scholarships for co-op interns and graduate students, and comparable project-oriented funding from manufacturers. The benefit for the end-user is a principle called academic freedom, in this case,

- the freedom of a professor or student to speak out relative to the pros and cons of any equipment brought to them to benchmark.
- The freedom to design the research project without outside meddling from the manufacturer.

Fortunately, our budget is lean and cost effective as you would expect for a non-profit research institute. As long as we are not desperate for money we can avoid the temptation to accept payment for reprinting corporate PR hype. So the funding is used for practical research. We do not accept (nor believe) and certainly do not regurgitate corporate PR. For example, how many manufacturer's PR photos of their products have you seen in our reports or on our web sites?

Besides, it does not take any money to see which printers and RIPs function as advertised and which don't. We saw one hyped printer grind to a halt, malfunction, or otherwise publicly display its incapacities at several trade shows in a row. At each of those same trade shows another brand had over 30 of their printers in booths in virtually every hall, each one producing museum quality exhibits. Not our fault when we report what we see over and over and over again. One of our readers wrote us recently, "Nicholas, last month you recommended the ..... as one of several possible printers for our needs; we bought this. It was the best capital expenditure we have made in the last several years. Just wanted to tell you how much we appreciate your evaluations...."

FLAAR is a non-profit educational and research organization dedicated for over 36 years to professional photography in the arts, tropical flora and fauna, architectural history, and landscape panorama photography.

Our digital imaging phase is a result of substantial funding in 1996 from the Japanese Ministry of Public Education for a study of scanning and digital image storage options. This grant was via Japan's National Museum of Ethnology, Osaka, Japan. That same year FLAAR also received a grant of \$100,000 from an American foundation to do a feasibility study of digital imaging in general and the scanning of photographic archives in particular.

The FLAAR web sites began initially as the report on the results of these studies of scanners. Once we had the digital images we began to experiment with digital printers. People began to comment that our reports were unique and very helpful. So by 1999 we had entire sections on large format printers.

FLAAR has existed since 1969, long before inkjet printers existed. Indeed we were writing about digital imaging before HP even had a color inkjet system available. In 2000 FLAAR received an educational grant from Hewlett-Packard large format division, Barcelona, Spain, for training, for equipment, and to improve the design and navigation on the main web sites of the FLAAR Network. This grant ran its natural course, and like all grants, reached its finishing point, in this case late 2005.

In some cases the sponsorship process begins when we hear end-users talking about a product they have found to be better than other brands. We keep our ears open, and when we spot an especially good product, this is the company we seek sponsorship from. It would not be wise of us to seek sponsorship from a company with a sub-standard or otherwise potentially defective printer. So we usually know which printers are considered by end-users to be among the better brands before we seek sponsorship. After all, out of the by now one million readers, we have heard plenty about every single printer out there.

We thank MacDermid ColorSpan (now part of HP), Hewlett-Packard, Parrot Digigraphic, Color DNA, Canon, Gandinnovations, and other companies for providing funding for technology training for the FLAAR staff and our colleagues at Bowling Green State University in past years and for funds to allow us to attend all major international trade shows, which are ideal locations for us to gather information. We thank EskoArtwork, EFI Rastek, EFI VUTEk, MTEX, Decal, DigiDelta, Sky Air-Ship, OTF (Obeikan), Drytac, DigiFab, , Seiko II, Parrot Digigraphic, , Sepiax inks, Sam-Ink, Jetbest inks, Hongsam ink, InkTec ink, and Dilli for providing funds so that we can make more of our publications free to end-users. During 2000-2001 we had grants to cover all the costs of our publications, and all FLAAR Reports were free in those early years. As that early grant naturally expired after a few years, we had to begin charging for some of our reports to cover costs. Now (in 2011), we are seeking corporate sponsorship so we can gradually make another 20% of our publications free to our readers.

Since 2006 we do a major part of our evaluations at the factory and headquarters demo room. Since the university does not fund any of these trips, it is traditional for the manufacturer to fund a research sponsorship. In the US this is how most university projects are initiated for decades now, and it is increasing. In fact there is a university in Austria that is not an "edu" but is a "GmbH", funded by the chamber of commerce of that part of Austria. In other words, a university as an educational institution, but functioning in the real world as an actual business. This is a sensible model, especially when FLAAR staff need to be on the road over a quarter of a million miles per year (roughly over 400,000 km per year total for the staff). Obviously this travel is hosted since unless money falls from heaven there most realistic way to obtain funding to get to the demo rooms for training is direct from the source.

It has been helpful when companies make it possible for us to fly to their headquarters so we can inspect their manufacturing facilities, demo rooms, and especially when the companies make their research, engineering and ink chemistry staff available for discussions. When I received my education at Harvard I was taught to have a desire to learn new things. This has guided my entire life and is what led me into wide-format digital imaging technology: it is constantly getting better and there is a lot to learn every month. Thus I actively seek access to improving my understanding of wide format printer technology so that we can better provide information to the approximately quarter-million+ readers of our solvent and UV printer web site ([www.large-format-printers.org](http://www.large-format-printers.org)) and the over half a million who read either our wide-format-printers.org site or our roughly half million combined who read our digital-photography.org and [www.FineArtGicleePrinters.org](http://www.FineArtGicleePrinters.org) sites.

Barbieri electronic (color management), Caldera (RIP), ColorSpan, DEC, Durst, EFI, EskoArtwork, Gerber, Grapo, IP&I, Mimaki USA, Mutoh, Obeikan, Dilli, Drytac, GCC, NUR, Oce, Shiraz (RIP), Sky AirShip, Sun, Teckwin, VUTEk, WP Digital, Polytype, Xerox, Yuhan-Kimberly, MTEX, Decal, DigiDelta, Zund have each brought FLAAR staff to their headquarters and printer factories. Sepiax, AT Inks, Bordeaux, InkWin, Sepiax, Sam-Ink, Jetbest, Hongsam, InkTec, and Sunflower ink have brought us to inspect their ink manufacturing facilities and demo rooms. Notice that we interact with a wide range of companies: it is more helpful to our readers when we interact with many different companies rather than just one.



However each ink company makes many products and merely because we have been to their factory does not automatically mean that we recommend their inks. It is important that we also visit end-users, and this has not been possible with Bordeaux or Sunflower inks.

We have visited the world headquarters and demo rooms of HP in Barcelona and received informative and helpful technology briefings from HP about every two years. We are under NDA as to the subjects discussed but it is important that we be open where we have visited. Mimaki Europe has had FLAAR as their guest in Europe to introduce their flatbed UV printer, as have other UV-curable manufacturers, again, under NDA as to the details since often we are present at meetings where unreleased products are discussed. Xaar has hosted an informative visit to their world headquarters in the UK. You don't get this level of access from a trade magazine writer, and I can assure you, we are provided much more detailed information and documentation in our visits than would be provided to a magazine author or editor. Companies have learned that it's a lot better to let us know up front and in advance the issues and glitches with their printers, since they now know we will find out sooner or later on our own. They actually tell us they realize we will find out on our own anyway.

Contributions, grant, sponsorships, and project funds from these companies are also used to improve the design and appearance of the web sites of the FLAAR Information Network. We thank Canon, ColorSpan, HP, ITNH, and Mimaki for providing wide format printers, inks, and media to the universities where FLAAR does research on wide format digital imaging. We thank Epson America for providing an Epson 7500 printer many years ago, and Parrot Digigraphic for providing three different models of Epson inkjet printers to our facilities on loan at BGSU (5500, 7600, 7800). We thank Mimaki USA for providing a JV4 and then a Mimaki TX-1600s textile printer and Improved Technologies (ITNH) providing their Ixia model of the Iris 3047 giclee printer.

We thank 3P Inkjet Textiles and HP for providing inkjet textiles so we could learn about the different results on the various textiles. IJ Technologies, 3P Inkjet Textiles, ColorSpan, Encad, HP, Nan Ya Pepa, Oracal, Tara and other companies have provided inkjet media so we can try it out and see how it works (or not as the case may be; several inkjet media failed miserably, one from Taiwan, the other evidently from Germany!). We thank Aurelon, Canon, ColorGate, ColorSpan, ErgoSoft, HP, PerfectProof, PosterJet, Onyx, Ilford, CSE ColorBurst, ScanvecAmiable, Wasatch and many other RIP companies for providing their hardware and software RIPs.

We thank Dell Computers for providing awesome workstations for testing RIP software and content creation with Adobe Photoshop and other programs. We also appreciate the substantial amount of software provided by Adobe. As with other product loaned or provided courtesy of ProVar LLC (especially the 23" monitors which makes it so much easier to work on multiple documents side by side).

We thank Betterlight, Calumet Photographic, Global Graphics, Westcott, Global Imaging Inc. Phase One, and Bogen Imaging for helping to equip our archaeological photo studios at the university and its archaeology museum in Guatemala. Heidelberg, Scitex, CreoScitex (now Kodak) and Cruse, both in Germany, have kindly provided scanners for our staff to evaluate.

We really liked some of the results whereas some of the other products were a bit disappointing. Providing samples does not influence the evaluations because the evaluators are students, professors, and staff of Bowling Green State University. These personnel are not hired by any inkjet printer company; they were universities employees (as was also true for Nicholas Hellmuth). The testing person for the HP ColorPro (desktop printer) said he frankly preferred his Epson printer. When we saw the rest results we did not include this Hewlett-Packard

ColorPro printer on our list of recommended printers, but we love our HP DesignJet 5000ps so much we now have two of them, one at each university.

Sometimes we hear horror stories about a printer. The only way we can tell whether this is the fault of the printer design, or lack of training of the operator, is to have the printer ourselves in-house. Of course some printer manufacturers don't understand the reasons we need to have each make and model; they are used to loaning their demo units for a week or so. That is obviously inadequate for a serious review.

Some of the media provided to us failed miserably. Three printers failed to meet common sense usability and printability standards as well (HP 1055, one older desktop model (HP Color Pro GA), and one Epson). Yet we know other users who had better results; maybe ours came down the assembly line on a Monday or Friday afternoon, when workers were not attentive. One costly color management software package was judged "incapable" by two reviewers (one from the university; second was an outside user who had made the mistake of buying this package).

So it's obvious that providing products or even a grant is no shield from having your products fail a FLAAR evaluation. The reason is clear: the end user is our judge. The entire FLAAR service program is to assist the people who need to use digital imaging hardware and software. If a product functions we find out and promulgate the good news. If a product is a failure, or more likely, needs some improvement in the next generation, we let people know. If a product is hyped by what an informed user would recognize as potentially false and misleading nonsense, then we point out the pathetic discrepancies very clearly.

This is what you should expect from an institute which is headed by a professor.

Actually, most of our reviews are based on comments by end users. We use their tips to check out pros and cons of virtually every product we discuss. You can't fool a print shop owner whose printer simply fails to function as advertised. And equally, a sign shop owner who earns a million dollars a year from a single printer brand makes an impact on us as well. We have multiple owners of ColorSpan printers tell us that this printer is their real money earner for example. We know other print shops where their primary income is from Encad printers. Kinkos has settled on the HP 5000 as its main money maker production machine, and so on.

Yet we have documentation of several print shop companies whose business was ruined by specific brands that failed repeatedly. It is noteworthy that it is always the same brand or printer at both locations: one due to banding and printheads then simply no longer printing one color; the other brand due to pokiness of the printer simply not being competitively fast enough. Same with RIPs, we have consistent statements of people using one RIP, and only realizing how weak it was when they tried another brand which they found substantially better. Thus we note that companies which experiment with more than one brand of product tend to realize more quickly which brand is best. This is where FLAAR is in an ideal situation: we have nine RIPs and 25 printers. Hence it is logical that we have figured out which are best for our situation.

Grant funding, sponsorship, demonstration equipment, and training are supplied from all sides of the spectrum of printer equipment and software engineering companies. Thus, there is no incentive to favor one faction over another. We receive support from three manufacturers of thermal printheads (Canon, ColorSpan and HP) and also have multiple printers from three manufacturers of piezo printers (Epson, Seiko, Mutoh, and Mimaki). This is because piezo has definite advantage for some applications; thermal printheads have advantages in different applications. Our reviews have universal appeal precisely because we feature all competing printhead technologies. Every printer, RIPs, inks,

or media we have reviewed have good points in addition to weaknesses. Both X-Rite and competitor GretagMacbeth provided spectrophotometers. Again, when all sides assist this program there is no incentive to favor one by trashing the other. Printer manufacturer ad campaigns are their own worst enemy. If a printer did not make false and misleading claims, then we would have nothing to fill our reviews with refuting the utter nonsense that is foisted on the buying public.

It is not our fault if some printers are more user friendly, print on more media than other brands. It is not our fault that the competing printers are ink guzzlers, are slow beyond belief, and tend to band or drop out colors all together. We don't need to be paid by the printer companies whose products work so nicely in both our universities on a daily basis. The printers which failed did so in front of our own eyes and in the print shops of people we check with. And actually we do try to find some redeeming feature in the slow, ink gulping brands: they do have a better dithering pattern; they can take thick media that absolutely won't feed through an HP. So we do work hard at finding the beneficial features even of printers are otherwise get the most critique from our readers. Over one million people will read the FLAAR Information Network in the next 12 months; 480,000 people will be exposed to our reports on wide format printers from combined total of our three sites on these themes. You can be assured that we hear plenty of comments from our readers about which printers function, and which printers fail to achieve what their advertising hype so loudly claims.

An evaluation is a professional service, and at FLAAR is based on more than 12 years of experience. An evaluation of a printer, an ink, media, substrate, a software, laminator, cutter or whatever part of the digital printing workflow is intended to provide feedback to all sides. The manufacturers appreciate learning from FLAAR what features of their printers need improvement. In probably half the manufacturers FLAAR has dealt with, people inside the company did not, themselves, want to tell their boss that their pet printer was a dog. So printer, software, and component manufacturers have learned that investing in a FLAAR evaluation of their product provides them with useful return on investment. Of course if a printer manufacturer wants only a slick Success Story, or what we call a "suck up review" that simply panders to the manufacturer, obviously FLAAR is not a good place to dare to ask for such a review. In several instances it was FLAAR Reports that allowed a company to either improve their printer, or drop it and start from scratch and design a new and better one.

And naturally end-users like the opportunity to learn about various printers from a single source that covers the entire range from UV through latex through all flavors of solvent.

We have also learned that distributors often prefer to accept for distribution a printer or other product on which a FLAAR Report already exists.

We turn down offers of funding every year. These offers come from PO Box enterprises or products with no clearly visible point of manufacture. Usually the company making the offer presumes they can buy advertising space just by paying money. But that is not what our readers want, so we politely do not accept such offers of money.

Contributions, grants, sponsorships, and funding for surveys, studies and research is, however, open to a company who has an accepted standing in the industry. It is helpful if the company has a visible presence at leading trade shows and can provide references from both end users and from within the industry. Where possible we prefer to visit the company in person or at least check them out at a trade show. Obviously the product needs to have a proven track record too. Competing companies are equally encouraged to support the FLAAR system. We feel that readers deserve to have access to competing information. Competition is the cornerstone of American individualism and technological advancement.

FLAAR also covers its costs of maintaining the immense system of 8 web sites in three languages and its facilities in part by serving as a consultant such as assisting inkjet manufacturers learn more about the pros and cons of their own printers as well as how to improve their next generation of printers. It is especially useful to all concerned when manufacturers learn of trends (what applications are popular and for what reasons). For example, manufacturers need to know whether to continue designing software for Mac users, or concentrate software for PC users. So the survey form that you fill out is helpful to gather statistics. You benefit from this in two ways: first, you get the FLAAR reports in exchange for your survey form. Second, your comments bring (hopefully) change and improvement in the next generation of printers. When we do survey statistics, then the names, addresses, and telephone numbers are removed completely. A survey wants only aggregate numbers, not individuals. However, if you ask about a specific brand of printer, and do not opt out, we forward your request to a pertinent sponsor so you can obtain follow-up from that brand, since we ourselves do not have enough personnel to respond to each reader by telephone. But we do not provide your personal information to outsiders and our survey form has an opt out check-off box which we honor.

FLAAR also serves as consultants to Fortune 500 companies as well as smaller companies and individuals who seek help on which printers to consider when they need digital imaging hardware and software. FLAAR is also consultant to ink, media, printer, coater, and cutter manufacturers, especially on their new next-generation products. We can better assist everyone when we know what products will be available in the coming year.

A modest portion of our income comes from our readers who purchase the FLAAR series. All income helps continue our tradition of independent evaluations and reviews of inkjet printers, RIPs, media, inks, cutters, laminators, and color management systems.



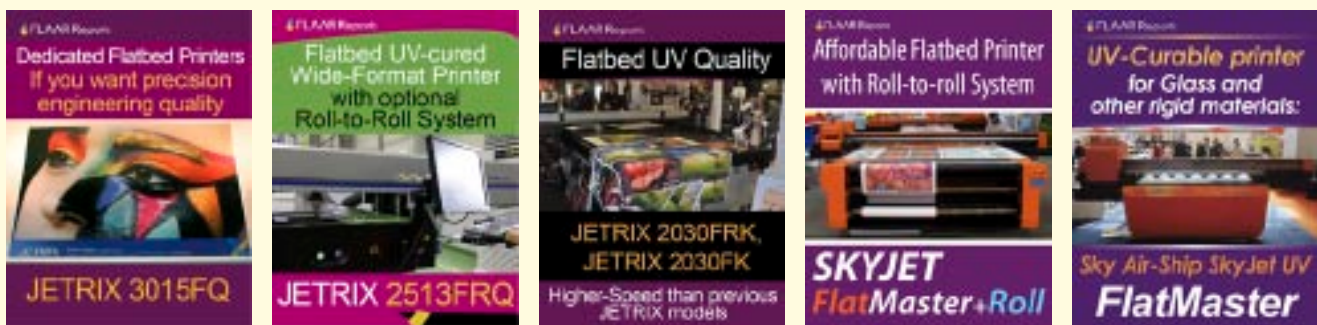
## These are some of the recent FLAAR Reports on UV for **2010 - 2011**

There are also even more available from 2009 (some of which are still pertinent).



These are some recent reports on interesting UV flatbed printers

Based on notes gathered at trade shows, actual sign shops and the very manufacturing plants.



## These are some of the TRENDS level of FLAAR Reports on UV for **2010 - 2011**

There are also even more available from 2009 (some of which are still pertinent).

